United States Court of Appeals
for the
District of Columbia Circuit

TRANSCRIPT OF RECORD

TRANSCRIPT OF RECORD

United States Court of Appeals for the District of Columbia

APRIL TERM, 1936.

No. 6790

27

FREDERICK M. BECKET, APPELLANT,

vs.

CONWAY P. COE, COMMISSIONER OF PATENTS.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR
THE DISTRICT OF COLUMBIA.

FILED JULY 20, 1936

PRINTED SEPTEMBER 10, 1936

United States Court of Appeals for the District of Columbia

APRIL TERM, 1936.

No. 6790

FREDERICK M. BECKET, APPELLANT,

vs.

CONWAY P. COE, COMMISSIONER OF PATENTS, APPELLEE.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA.

INDEX

	Original	Print
Caption	a	1
Bill	1	1
Answer to Bill	6	6
Supplemental bill	8	8
Answer to supplemental bill	11	11
Findings of fact	13	13
Conclusions of law	14	14
Final decree	15	15
Appeal noted by Becket, cost bond on appeal fixed in the sum of $100, or in lieu thereof the sum of $50. in cash	16	15
Memorandum: $50 deposited in lieu of bond on appeal	16	15
Order making statement of evidence part of record	16	15
Assignment of errors	17	16
Stipulation and designation of record	18	17
Clerk's certificate	21	19
Statement of Evidence	22	19
Testimony of Russell Franks	23	20
Frederick M. Becket	31	25
Exhibits	37	30

PRESS OF BYRON S. ADAMS, WASHINGTON, D. C.

United States Court of Appeals for the District of Columbia

a In the District Court of the United States for the District of Columbia.

No. 56792 In Equity

Frederick M. Becket, *Plaintiff*,

v.

Conway P. Coe, Commissioner of Patents, *Defendant*.

United States of America,
District of Columbia. ss:

BE IT REMEMBERED, That in the District Court of the United States for the District of Columbia, at the City of Washington, in said District, at the times hereinafter mentioned, the following papers were filed and proceedings had, in the above-entitled cause, to wit:—

1 *Bill of Complaint to Secure Issuance of Patent*

(under Section 4915 Revised Statutes)

Filed February 10 1934

In the Supreme Court of the District of Columbia

Holding An Equity Court

Frederick M. Becket,
Plaintiff

v.

Conway P. Coe, Commissioner of Patents,
Defendant

In Equity No. 56792

To the Honorable Judges of the Supreme Court of the District of Columbia:

The Plaintiff states as follows:

1. The plaintiff, Frederick M. Becket, is a citizen of the United States and a resident of New York, in the County and State of New York, and brings this suit in his own right.

2. The defendant, Conway P. Coe, is the Commissioner of Patents of the United States, having his legal residence in the State of Maryland and his official residence in the District of Columbia and is sued in his official capacity as Commissioner of Patents of the United States.

3. This bill is filed in accordance with the provisions of the Federal laws of the United States as provided for under Revised Statute 4915.

4. The plaintiff, Frederick M. Becket, did invent certain new and useful improvements in STAIN RESISTING ALLOYS for which he, on December 18, 1930, filed an application for Letters Patent of the United States,
2 which application was given the Serial Number
503,328. The said application contains the following claims to the invention to which plaintiff believes himself to be entitled, to wit:

9. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of Chromium; about 0.25% to about 2.75% of copper; carbon, the carbon content being not more than about 0.3%; at least about 3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 6% and about 14%, the balance of the alloy being substantially iron.

10. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of chromium; about 0.25% to about 2.5% of copper; carbon, the carbon content being not more than about 0.12%; at least about 3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 8% and about 14%; the balance of the alloy being substantially iron.

11. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of Chromium; about 0.25% to about 2.5% copper; carbon, the carbon content being not more than about 0.12%; at least about 5.3% of manganese and at least

about 2% of nickel, the sum of the manganese and nickel percentages falling between about 8% and about 14%; the balance of the alloy being substantially iron.

as by reference to said application, or duly authenticated copy thereof, here in Court to be produced, will more fully and at large appear, and plaintiff makes profert of a duly authenticated copy of said application and proceeding relating thereto here in Court to be produced.

5. The said application was filed in accordance with the laws of the United States and the Rules of Practice in the United States Patent Office.

6. The said application has been duly prosecuted in accordance with the Laws of the United States and the Rules of Practice in the United States Patent Office.

7. The said application has been passed upon by the Primary Examiner who refused to allow the following claims:

9. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of Chromium; about 0.25% to about 2.75% of copper; carbon, the carbon content being not more than about 0.3%; at least about 3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 6% and about 14%; the balance of the alloy being substantially iron.

3 10. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of chromium; about 0.25% to about 2.5% of copper; carbon, the carbon content being not more than about 0.12%; at least about 3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 8% and 14%; the balance of the alloy being substantially iron.

which claims he on the 25th. day of August, 1932, finally and for a second time rejected in accordance with the Rules of Practice in the United States Patent Office.

8. On or about the sixth day of March, 1933, the following claim:

11. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of chromium; about 0.25% to about 2.5% copper;

carbon, the carbon content being not more than about 0.12%; at least about 5.3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 8% and about 14%; the balance of the alloy being substantially iron.

was entered in the said application for the purposes of appeal to the Board of Appeals of the United States Patent Office, in accordance with the Rules of Practice in the United States Patent Office.

9. The plaintiff on the 24th. day of February, 1933, appealed from the decision of the Primary Examiner to the Board of Appeals of the United States Patent Office who, after hearing duly had, affirmed the decision of the Primary Examiner dated August 12, 1933, finally rejecting claims 9 and 10, and considered and refused to allow the said claim 11 as set forth in paragraph 8 herein.

10. The plaintiff has taken no appeal to the United States Court of Customs and Patent Appeals from this decision of the Board of Appeals.

11. The Commissioner of Patents by the Board of Appeals contends that plaintiff's alloy shows no invention over the references:

4	Greaves et al (British)	117,286	of	1918
	Hadfield (French)	590,691	of	1925
	Hadfield (British)	313,471	of	1929
	Commentry (French)	666,789	of	1929

12. The plaintiff disagrees with this contention of the Commissioner of Patents, and contends that the references do not disclose the alloy which he describes and claims in the said application, and that his alloy involves an inventive concept.

13. The plaintiff further states that the said invention is new and useful, and was not known or used by others in this country before his invention thereof, and not patented or described in any printed publication in this or any foreign country before his invention thereof or more than two years prior to his application for patent therefor, and not in public use or on sale in this country for more than two years prior to said application, and not patented in any country foreign to the United States on an application

filed by him or his legal representatives or assigns more than twelve months prior to said application for United States patent and has not been abandoned.

WHEREFORE plaintiff brings this bill of complaint under and in accordance with the provisions of the Statutes (Section 4915 Comp. Stats. 9460; U.S.C. Title 35, Section 63) in such cases made and provided and prays:

1. That this Honorable Court may adjudge that the plaintiff, Frederick M. Becket, is entitled, according to law, to receive Letters Patent of the United States for the said invention as specified in the aforesaid claims 9, 10 and 11 of said application for patent of said Frederick M. Becket.

2. That this Honorable Court may decree that the Commissioner of Patents be directed to allow the aforesaid claims 9, 10 and 11 of said application for Letters Patent of said Frederick M. Becket and such other claims as upon hearing duly had the Court shall find the plaintiff to be justly entitled.

5 3. For such other and further relief in the premises as the nature of the case may require and as to this Honorable Court shall seem meet.

FREDERICK M. BECKET
By CHARLES C. SCHEFFLER
his attorney.

Washington, D. C.
February 10th, 1934.

POTTER, PIERCE & SCHEFFLER
Counsel for Plaintiff

RICHARD L. SCHEFFLER
of counsel

CHARLES C. SCHEFFLER
of counsel

WARREN J WILLIS
of counsel

RALPH E. PARKER
Of counsel.

Filed on behalf of
Frederick M. Becket
New York, N.Y.

STATE OF NEW YORK, COUNTY OF NEW YORK, *ss:*

I, Frederick M. Becket, being duly sworn, depose and say that I have read the foregoing Bill of Complaint and know the contents thereof, and that the statements of facts therein made are true to the knowledge of deponent.

FREDERICK M. BECKET
Plaintiff

Subscribed and sworn to before me this 9th day of February, 1934.

E DONNELL
(Seal) NOTARY PUBLIC, New York County
New York County Clerk's No. 104
New York County Register's No. 4D179
Commission expires March 30, 1934

6 *Answer to the Bill of Complaint.*

Filed February 20 1934

* * * * * * * * *

To the Honorable
The Judges of the Supreme Court
of the District of Columbia.

Conway P. Coe, Commissioner of Patents, defendant herein, in answer to the Bill of Complaint alleges on information and belief as follows:

1. He admits for the purpose of this suit the allegations of plaintiff's citizenship and residence.

2. He admits the allegation of defendant's residence.

3. He admits the allegation of jurisdiction under Section 4915 R. S., 35 U.S.C.A. 63, as amended.

4. He admits that plaintiff on December 18, 1930, filed an application for letters patent, to which application Serial No. 503,328 was given, and that said application contains claims 9, 10 and 11, recited in this paragraph. Defendant denies that plaintiff is entitled to these claims as they are held to be unpatentable over the following prior patents:

Greaves et al.,	British,	117,286,	of	1918,
Hadfield,	French,	590,691,	of	1925,
Hadfield,	British,	313,471,	of	1929,
Commentry,	French,	666,789,	of	1929.

Profert of copies of these patents is hereby made.

5. He admits that the application was filed in accordance with the laws and rules in force in the United States Patent Office.

6. He admits that the application was duly prosecuted.

7. He admits that the examiner passed upon and refused to allow claims 9 and 10, recited in this paragraph.

8. He admits that claim 11 was presented as stated in paragraph 8.

9. He admits that plaintiff on February 24, 1933, appealed from the decision of the primary examiner to the Board of Appeals and that the Board of Appeals in 7 a decision rendered August 12, 1933, affirmed the decision of the Examiner.

10. He admits that plaintiff has taken no appeal to the United States Court of Customs and Patent Appeals in this case.

11. He admits that the claims are held to be unpatentable over the prior patents cited in paragraph 11.

12. He denies that plaintiff's contention in paragraph 12 is correct, as more fully appears from the statement of the Examiner and the decision of the Board of Appeals, copies of which will be presented at the hearing.

13. Defendant has no information as to plaintiff's allegations of invention and non-existence of statutory bars except as informed by the Bill and by said application.

FURTHER ANSWERING defendant denies each and every allegation of the Bill of Complaint not herein specifically and sufficiently denied or admitted, and prays that plaintiff's Bill of Complaint be dismissed.

WHEREFORE defendant having fully answered the Bill of Complaint denies that plaintiff is entitled to the relief demanded or any part thereof and prays that the Bill be dismissed with all costs of the proceedings against the plaintiff as provided in Section 4915 R. S.

CONWAY P. COE
Commissioner of Patents,
Defendant.

T. A. HOSTETLER,
Solicitor of the U. S. Patent Office,
Attorney for Defendant.

District of Columbia,
City of Washington. ss.

I, Conway P. Coe, Commissioner of Patents, depose and
say that I have read the above answer by me subscribed
and know the contents thereof, and that the statements of
facts therein made as upon personal knowledge are
8 true, and those made upon information and belief I
believe to be true.

CONWAY P. COE
Commissioner of Patents.

Subscribed and sworn to before me this 20th day of February, 1934.

ALBERT W. KAISER
(Seal) *Notary Public, D. C.*

My commission expires March 21, 1938.

Supplemental Bill of Complaint to Secure Issuance of Patent

(under Section 4915 Revised Statutes)
Filed September 26 1935

* * * * * * * * *

To the Honorable Judges of the Supreme Court of the District of Columbia:

Supplemental to his Bill of Complaint heretofore filed herein, the Plaintiff states as follows:

I.

On Feb. 10, 1934, the Plaintiff filed the aforesaid Bill of Complaint under the provisions of Section 4915, Revised Statutes, to secure issuance of a patent, against Conway P. Coe, the Defendant herein, in his official capacity as the Commissioner of Patents of the United States.

II.

The said Bill of Complaint was duly served on the said Defendant and an answer to said Bill was filed on or about the 20th day of February, 1934. The cause, number 56,792, in Equity, was duly placed on the Calendar of the Court and is now awaiting a hearing before this Honorable Court.

III.

Thereafter, on November 22, 1934, the Plaintiff 9 filed in the United State Patent Office an amendment to the specification adding new claim 12 to the application, to which Plaintiff believes himself to be entitled, to wit:

12. A ferrous alloy characterized by its resistance to acid corrosion or intergranular corrosion, by its machineability and forgeability and its stable non-magnetic condition comprising chromium about 18%, nickel about 8%, copper about 1.5% to 3%, manganese about 4% to 6%, carbon not substantially above about 0.15% and silicon less than 1%, the balance being substantially all iron.

Claim 12 was copied from United States Letters Patent 1,962,702 issued June 12, 1934, to Percy A. E. Armstrong.

IV.

The said application has been duly prosecuted in accordance with the laws of the United States and the Rules of Practice in the United States Patent Office with respect to said claim 12.

V.

On December 17, 1934 said claim 12 was rejected by the Primary Examiner and on January 17, 1935 said claim 12 was again and finally rejected by the Primary Examiner.

VI.

The Plaintiff on January 26, 1935 duly appealed to the Board of Appeals from the action of the Primary Examiner in finally rejecting claim 12. The appeal was heard by the Board of Appeals and on June 7, 1935 said Board of Appeals affirmed the action of the Examiner in finally rejecting claim 12.

VII.

The Plaintiff has taken no appeal to the United States Court of Customs and Patent Appeals from this decision of the Board of Appeals.

VIII.

This supplemental Bill is filed in accordance with the provisions of the Patent Laws of the United States, to wit, Section 4915, Revised Statutes.

10

IX.

The Plaintiff further states that said invention is new and useful, and was not known or used by others in this country before his invention thereof, and not patented or described in any printed publication in this or any foreign country before his invention thereof or more than two years prior to said application, and not patented in any country foreign to the United States on an application filed by him or his legal representatives or assigns more than twelve months prior to said application for United States Letters Patent and has not been abandoned.

WHEREFORE, Plaintiff brings this supplemental Bill of Complaint under and in accordance with the provisions of the Statutes (Section 4915 Comp. Stats. 9460; U. S. C. Title 35, Sec. 63) in such cases made and provided and prays:

1. That this Honorable Court may adjudge that the Plaintiff, Frederick M. Becket, is entitled, according to law, to receive Letters Patent of the United States for the said invention as specified in the aforesaid claim 12, as well as claims 9, 10, and 11, of said application for patent of said Frederick M. Becket.

2. That this Honorable Court may decree that the Commissioner of Patents be directed to allow the aforesaid claim 12, as well as claims 9, 10 and 11 of said application for Letters Patent of said Frederick M. Becket and such other claims as upon hearing duly had the Court shall find the Plaintiff to be justly entitled.

3. For such other and further relief in the premises as the nature of the case may require and as this Honorable Court shall seem meet.

FREDERICK M. BECKET
By C C SCHEFFLER
His Attorney

Washington, D. C.,

Counsel for Plaintiff
RICHARD L. SCHEFFLER
CHARLES C. SCHEFFLER
WARREN J WILLIS

11 Filed on behalf of
Frederick M. Becket

RALPH E. PARKER
of Counsel.

STATE OF NEW YORK,
County of New York, ss:

I, Frederick M. Becket, being duly sworn, depose and say that I have read the foregoing supplemental Bill of Complaint and know the contents thereof and that the statements of facts therein made are true to the knowledge of deponent.

FREDERICK M. BECKET
Plaintiff

Sworn to and subscribed before me this 25th day of September, 1935.

E DONNELL
(Seal) NOTARY PUBLIC, New York County
New York County Clerk's No. 96
New York County Register's No. 6-D-144
Commission expires March 30, 1936

Answer to the Supplementary Bill of Complaint.

Filed October 5 1935

* * * * * * * * *

To the Honorable
The Judges of the Supreme Court
of the District of Columbia.

Conway P. Coe, Commissioner of Patents, defendant herein, in answer to the Supplemental Bill of Complaint alleges on information and belief as follows:

I. He admits the allegation of the filing of the original Bill.

II. He admits that a copy of the Bill of Complaint was served upon him and that an Answer was filed and the case was given Equity No. 56,792.

12 III. He admits the allegation as to the filing by the plaintiff of an amendment in his application for patent No. 503,328, in which he presented a claim numbered 12, which was copied from patent No. 1,962,702, issued to Percy A. E. Armstrong.

IV. He admits the allegation as to the duly prosecution of the application with respect to that claim.

V. He admits the allegation as to the final rejection of that claim by the Primary Examiner and avers that said rejection was based upon the ground that the claim was not supported by plaintiff's original application and therefore constituted new matter therein.

VI. He admits the allegation as to the taking of an appeal and the affirmance of the action of the Primary Examiner by the Board of Appeals of the Patent Office.

VII. He admits that no appeal was taken from the decision of the Board of Appeals to the United States Court of Customs and Patent Appeals.

VIII. He admits the allegation as to the filing of the Supplemental Bill.

IX. He admits that in his original application the plaintiff Becket made averments substantially corresponding to the allegations of paragraph IX of the Supplemental Bill, but denies that these averments are sufficient to support the allowance of claim 12 in that application since it is held that the original application of Becket does not support that claim and that said claim therefore constitutes new matter in that application.

WHEREFORE defendant having fully answered the Supplemental Bill of Complaint denies that plaintiff is entitled to the relief demanded or any part thereof and prays that the Bill be dismissed with all costs of the proceedings against the plaintiff as provided in Section 4915 R. S.

CONWAY P. COE
Commissioner of Patents, Defendant.

13 R. F. WHITEHEAD
Solicitor of the U. S. Patent Office,
Attorney for Defendant.

DISTRICT OF COLUMBIA: *ss:*

I, Conway P. Coe, Commissioner of Patents, depose and say that I have read the above answer by me subscribed and know the contents thereof, and that the statements of facts therein made as upon personal knowledge are true, and those made upon information and belief I believe to be true.

CONWAY P. COE
Commissioner of Patents.

Subscribed and sworn to before me this 4th day of October, 1935.

E. W. LIBBEY
(Seal) *Notary Public, D. C.*
My commission expires July 10, 1938.

Findings of Fact.

Filed March 13 1936

* * * * * * * * *

1. The Becket application, No. 503,328, discloses a ferrous alloy containing chromium 16% to 22%, manganese at least 3%, copper 0.25% to 2.75%, nickel at least 2%, carbon not more than 0.3%, and the remainder substantially iron, the sum of the percentages of manganese and nickel falling between about 6% and about 14%.

2. The French patent to Hadfield, No. 590,691, discloses a ferrous alloy containing chromium 5% to 25%, manganese up to 8%, copper up to 6%, nickel 2% to 20%, carbon less than 1%, silicon 1% to 10%, and tungsten or molybdenum up to 6%, with balance substantially iron.

3. The French patent to Commentry, No. 666,789, discloses a ferrous alloy containing chromium 15% to 30%, manganese 2% to 12%, copper up to 6%, nickel 2%
14 to 12%, carbon less than 1%, balance substantially iron, the sum of the percentage of manganese and nickel falling between 8% and 20%.

4. The Armstrong patent, No. 1,962,702, discloses a ferrous alloy containing chromium 12% to 25%, manganese 2% to 12%, copper 1% to 3%, nickel about 7% to 30%, carbon not over 0.3% and preferably less than 0.15%, balance substantially iron, the manganese content being at least equal to, but not more than 4 times the copper content.

5. Claim 6 of the Armstrong patent specifies proportions as follows: chromium about 18%, nickel about 8%, copper about 1.5% to 3%, manganese about 4% to 6%, carbon not substantially above about .15%, silicon less than 1%, the balance being substantially all iron.

6. The field of compositions disclosed by Becket is intermediate in scope between the field specified in claim 6 of Armstrong and the fields of the French patents to Hadfield and Commentry.

Conclusions of Law.

1. The ranges of percentages of the ingredients of the Becket alloy as given in his application all fall within the range of the percentages of the corresponding ingredients of the alloy of the French patent to Hadfield and the alloy of the French patent to Commentry, the sum of the percentages of manganese and nickel in the Becket alloy falls within the range given in the French patent to Commentry for the sum of the manganese and nickel.

2. The Becket application does not point out in what respect the ranges of percentages of the various ingredients of the alloy are critical or that striking or unobvious results are obtained within these ranges.

3. Claims 9, 10 and 11 of the Becket application are not patentable over the French patent to Hadfield or over the French patent to Commentry.

15 4. The patent to Armstrong points out the critical nature of the specified percentages of the ingredients of the alloy, particularly with reference to the greatly increased resistance to intergranular corrosion.

5. Becket, having not pointed out in his application any such critical nature, in the specified percentages of ingredients of his alloy, and having given no example in his application of an alloy having the percentages specified in claim 6 of the Armstrong patent, is not entitled to make claim 12 of his application, which is a copy of claim 6 of the Armstrong patent.

6. Although claim 12 of the Becket application (which is identical with claim 6 of the Armstrong patent 1,962,702) may well be patentable to Armstrong as a particular combination of elements in particular proportions within a broader disclosure of the prior art, where some new and unobvious result is secured and proven; claim 12 is not patentable to Becket, because he has not shown and/or proven any new and unobvious result.

7. Claim 12 of the Becket application is not patentable to him.

8. The Bill of Complaint should be dismissed.

ALFRED A WHEAT—
Chief Justice.

Final Decree.

Filed March 13 1936

* * * * * * * * *

This cause having come on to be heard and having been tried in open court and argued by counsel for the respective parties upon the pleadings and proofs adduced and submitted to the Court,

16 It is ADJUDGED, ORDERED and DECREED this 13th day of March, 1936, that the Bill of Complaint in this case be, and the same hereby is dismissed with costs against the plaintiff.

ALFRED A WHEAT—
Chief Justice.

Approved as to Form:

RICHARD L. SCHEFFLER
Attorney for Plaintiff.

From the foregoing decree the plaintiff, Frederick M. Becket, in open court on the date named above, notes an appeal to the United States Court of Appeals for the District of Columbia, and the Court fixes the cost bond on said appeal in the sum of $100, or in lieu thereof the sum of $50 in cash to be deposited with the Clerk of this Court.

ALFRED A. WHEAT—
Chief Justice.

Memorandum

April 4—1936

$50 deposited in lieu of bond on appeal.

Supreme Court of the District of Columbia

Monday, April 20, 1936

The Court resumes its sessions pursuant to adjournments, the Justices sitting in Equity, presiding.

* * * * * * * * *

Come now the parties hereto by their respective attorneys of record, and thereupon, the plaintiff by his attorney presents to the Court his Statement of Evidence taken at

the trial of this cause, and prays that the same be
17 signed and made of record, nunc pro tunc, which is
hereby accordingly done.

ALFRED A. WHEAT,
Chief Justice.

Assignment of Errors

Filed April 21 1936

* * * * * * * *

Now comes the plaintiff in the above-entitled cause and files the following assignment of errors upon which he will rely upon the prosecution of his appeal from the decree of this Honorable Court, entered on the 13th day of March, 1936:

I The Court erred in dismissing the Bill of Complaint herein.

II The Court erred in not entering a decree adjudging that the plaintiff is entitled, according to law, to receive Letters Patent on his application Serial No. 503,328 filed December 18, 1930, as specified in the claims 9, 10, 11, and 12 recited in the Bill of Complaint herein.

III The Court erred, in matter of law, in concluding that the subject-matter of the claims 9, 10, 11, and 12 of the aforesaid application, Serial No. 503,328, is unpatentable to the plaintiff herein over the prior French patent to Hadfield No. 590,691 and the prior French patent to Commentry, No. 666,789, adduced by defendant.

IV The Court erred in concluding that the plaintiff's aforesaid application, Serial No. 503,328, does not point out in what respect the ranges of percentages of the various ingredients of the alloy are critical or that striking or unobvious results are obtained within these ranges.

V The Court erred, in matter of law, in concluding that
the plaintiff herein, having not pointed out in his
18 application any such critical nature in the specified
percentages of ingredients of his alloy, and having given no example in his application of an alloy having the percentages specified in claim 6 of Armstrong patent 1,962,702, is not entitled to make in his application said claim 6 of Armstrong patent 1,962,702.

VI The Court erred, in matter of law, in concluding that claim 12 recited in the Supplemental Bill of Complaint herein is not patentable to the plaintiff herein because he has not shown and/or proven any new and unobvious result.

VII The Court erred, in matter of law, in concluding that claim 12 recited in the Supplemental Bill of Complaint herein is not patentable to the plaintiff herein.

Wherefore, Plaintiff prays that the said decree may be revised and reversed.

RICHARD L. SCHEFFLER
Solicitor for Plaintiff

Service of copy acknowledged

R. F. WHITEHEAD
Attorney for Defendant

Stipulation and Designation of Record

Filed April 21 1936

* * * * * * * * *

The Clerk will please prepare and transmit to the United States Court of Appeals for the District of Columbia, as the record in the above-entitled cause, the following papers which, it is stipulated, shall constitute the printed record on appeal:

I Bill of Complaint.
II Answer to Bill of Complaint.
III Supplemental Bill of Complaint.
IV Answer to Supplemental Bill of Complaint.
V Condensed Narrative Statement of Evidence.
VI Plaintiff's Exhibits as follows:

1. Certified copy of Becket application Serial No. 503,328 as filed. 19

VII. Defendant's Exhibits as follows:

A. United States patent No. 1,962,702 to Armstrong;
B. British patent No. 117,286 to Greaves et al;
C. British patent No. 313,471 to Hadfield;
D. French patent No. 590,691 to Hadfield, and stipulated translation thereof;

E. French patent No. 666,789 to Commentry, and stipulated translation thereof;

F. Statement of Examiner, dated March 20, 1933;

G. Statement of Examiner, dated February 9, 1935;

H. Decision of Board of Appeals, dated August 12, 1933;

I. Decision of Board of Appeals, dated June 7, 1935.

VIII Findings of Fact and Conclusions of Law.

IX Final Decree, Notation of Appeal, and Order fixing amount of Appeal Bond.

X Docket Entry showing cash deposit in lieu of Appeal Bond.

XI Assignment of Errors.

XII This Stipulation and Designation of Record.

It is hereby stipulated and agreed that the following exhibits shall be transmitted to, and be considered by, the United States Court of Appeals for the District of Columbia, as physical exhibits, to wit:

Plaintiff's Exhibit Numbers:

2. Sample of steel containing more copper than called for by plaintiff's claims in Serial No. 503,328.

3. Sample of steel containing more chromium than called for by plaintiff's claims in Serial No. 503,328.

4. Sample of deep-drawn article made of steel claimed by plaintiff in Serial No. 503,328.

5. Fifteen samples of five steels, all steels being
20 within claims of Becket Serial No. 503,328, two of
the steels being within claim 6 of Armstrong patent
1,962,702, and three of the steels being within claim 1 of
Armstrong patent 1,962,702.

7. Five photomicrographs of the five steels forming Plaintiff's Exhibit.

RICHARD L SCHEFFLER
Solicitor for Plaintiff
R. F. WHITEHEAD
Solicitor for Defendant

21 In the District Court of the United States for the District of Columbia.

UNITED STATES OF AMERICA,
District of Columbia, ss:

I, Charles E. Stewart, Clerk of the said Court, hereby certify the foregoing pages numbered from 1 to 20, both inclusive, to be a true and correct transcript of the record according to directions of counsel herein filed, copy of which is made of this transcript, in cause No. 56792 in Equity, wherein Frederick M. Becket is Plaintiff and Conway P. Coe, Commissioner of Patents, is Defendant, as the same remains upon the files and of record in said Court.

IN TESTIMONY WHEREOF, I hereunto subscribe my name and affix the seal of said Court, at the City of Washington, in said District, this 8th day of July, 1936.

C E STEWART,
(Seal) *Clerk.*

22 In the Supreme Court of the District of Columbia

In Equity No. 56,792

Filed Apr 20 1936

FREDERICK M. BECKET, *Plaintiff*,

vs.

CONWAY P. COE, Commissioner of Patents,
Defendant

Condensed Statement of Proceedings and Evidence

Be it remembered that at the trial of this cause before Mr. Chief Justice Wheat on February 7, 1936, proceedings were had and evidence was taken as follows:

Extracts from Opening Statements

Mr. Harrison, for the plaintiff: This invention is a chromium alloy steel which is characterized by stain resistance and the ability to be deep-drawn. Although chromium was added to steel as early as 1820, there was no appreciable commercial use of chromium steels until after the development of hard, stainless cutlery steels about 1912. The first stainless deep-drawing steel became available commercially about 1928. Shortly thereafter the second steel of that description, the steel of the present invention, was invented by the plaintiff. Plaintiff's steel was produced by combining certain very specific proportions of chromium and manganese, adding certain small amounts of nickel and of copper, and keeping his components within certain limits.

The Court: What is the patentable feature of it?

23 *Mr. Harrison:* The patentable feature of it is the material itself, which has new characteristics which have never before been available commercially. The Patent Office has granted a patent to a later applicant, Armstrong, on this same invention, the patent containing claims equivalent to those in issue here, but refuses the plaintiff a patent.

The Court: The claim is that there is peculiar combination of iron, carbon, manganese, chromium, copper, and nickel, combined in certain definite proportions, that constitutes the invention.

* * * * * *

Mr. Whitehead, for the defendant: Our position is that the plaintiff claims proportions falling within ranges of composition shown in two earlier French patents and has not discovered any unexpected properties characteristic only of his proportions. Armstrong disclosed unexpected properties for the proportions found by him, so his claims are patentable; but the plaintiff did not disclose those properties.

Statement of Evidence

Plaintiff offered in evidence a certified copy of the application Serial No. 503,328, Frederick M. Becket, as filed on December 18, 1930.

(Document received in evidence and
marked "Plaintiff's Exhibit No. 1")

Russell Franks, called as a witness on behalf of the Plaintiff, having been duly sworn, testified as follows:

Examination by Mr. Harrison: I live in Niagara
24 Falls, New York, where I am employed by the Union
Carbide and Carbon Research Laboratories as a research metallurgist. I have worked as a research man under the plaintiff for seventeen or eighteen years, doing research on special alloys and alloy steels, including chromium steels. My research experience has resulted in the publication of five or six technical papers on the subject.

At the request of the plaintiff, and under his direction, I have investigated between two hundred and two hundred and fifty steels of chromium-manganese type, of which about sixty were of the kind directly involved in this application. I made a complete investigation of the structural characteristics of these steels, which determine their physical characteristics, stain resistance and corrosion resistance.

Stain resistance is the ability of the metal to maintain a polish under normal conditions over a relatively long period of time. Stain resistance is a special kind of corrosion resistance, and is a characteristic of stainless steels. Other materials, nickel for example, will resist certain types of corrosion, acids for example, very well, but nickel will not resist tarnishing. A chromium manganese steel will resist the same acids and also resist tarnishing.

Deep drawing is a very definite term meaning the ability of a material to be deformed cold without rupture or setting up strains sufficient to cause subsequent rupture of the material.

The steels with which this application is con-
25 cerned are both stain resisting and deep drawing.

From my experience with steels generally, I have found that this combination of properties is rare. To my knowledge the only other steel having these properties is the austenitic "18-8" chromium nickel steel (*i. e.*, the austenitic steel containing about 18% of chromium with about 8% of nickel). From my experience with materials of the type defined in the claims involved in this action, I should say that it would make a very great difference in the deep drawing ability and stain resistance of the material if the limits set out in the (Becket) claims were materially departed from. If the chromium is substantially less than 16%, the material does not have sufficient stain resistance.

If the chromium is substantially above 22%, the material is very much harder to deep draw, that is, more power is required in forming a given part. There is also some difficulty in hot fabricating the article. If the sum of the manganese and nickel percentages is too low, that is, substantially less than 6%, the steel does not have an austenitic structure, and will not even approach an austenitic structure, and the material does not have deep drawing characteristics. If one were to depart substantially from the specific composition limits given by Becket, the material would not be as acceptable commercially for deep drawing and stain resistance. It is necessary to hot work these materials because deep drawing operations are ordinarily performed on steel which has been formed into sheets by rolling. If the copper exceeds about 2.75% it is no longer possible to hot work the steel. The carbon content should be kept as low as possible to improve deep drawing
26 characteristics and also stain resistance.

The effect of excess copper on the hot working properties of the steel is shown in this (indicating) sample of steel, which represents a partly worked, small, cast ingot containing about 18% chromium, around 12% manganese, 2% nickel, 3% copper, and only 0.10% carbon. In our attempts to hot fabricate this steel it cracked very badly on forging, with the result that it is practically useless from the standpoint of a material which is to be deep drawn.

Question by the Court: Just what is it about that particular ingot which makes it behave that way?

Answer: It is due to the copper content.

Question by the Court: Excessive copper is what makes those cracks there?

Answer: Yes sir. You see the grain boundaries of that steel are filled with copper, which has a lower melting point than steel, and when you heat the steel to the point necessary for forging, the temperature is higher than necessary for melting copper, and naturally the copper melts.

(The exhibit referred to was received in evidence and marked "Plaintiff's Exhibit No. 2").

Examination by Mr. Harrison continued: The effect of excessive chromium content on the steel is shown in this (indicating) sample which contains about 26% chromium, about 3.3% manganese, 10.5% nickel, around 2% of copper,

and 0.10% carbon. This second sample represents a small
ingot similar to that marked "Plaintiff's Exhibit No. 2",
and it is evident that there are difficulties due to
27 cracking from hot working. This steel could not be
hot worked well, because of its excessive content of
chromium.

(The sample referred to was received in evidence and marked "Plaintiff's Exhibit No. 3").

There seems to be a relation between the amount of copper and the amount of chromium that you can put in the steel, with the other elements of the steel, which will permit successful hot working.

This (indicating) third sample is of a properly balanced composition of chromium, manganese, nickel, copper and carbon, which has been taken from a properly hot worked, annealed sheet and deep drawn into an article, that is, an ash tray.

Examination by the Court: This sample is made from the steel that this suit is about. It is a sample of sheet which was polished, put into a press and pressed into shape.

(The sample referred to was received in evidence and marked "Plaintiff's Exhibit No. 4").

Examination by Mr. Harrison continued: I have read a
copy of Armstrong patent No. 1,962,702, from which was
copied claim No. 12 which is involved in this action, and I
am familiar with the claims and disclosure of that patent.
I have made and tested material which meets the specifica-
tion in claim 12 involved in this action (claim 6 of the Arm-
strong patent), and I have compared the properties of the
material defined in this claim with materials which al-
though not within claim 12, are within the broad
28 claims 9, 10 and 11, of the Becket application here
under consideration. I have never been able to ob-
serve any difference in the properties of the material de-
fined by the Armstrong patent from the materials through-
out the range of the Becket application. I have prepared
and tested material having the following compositions:

Composition of Sample

Sample	% Cr	% Mn	% Ni	% Cu	% C	% Si	% Fe
C-333	18.09	6.42	4.90	1.17	0.09	0.33	Rest
C-334	18.01	7.83	6.08	1.39	0.10	0.34	"
C-336	18.01	2.49	7.14	2.05	0.10	0.91	"
C-332	18.02	4.73	8.16	1.79	0.08	0.44	"
C-335	18.10	3.88	9.02	1.39	0.09	0.34	"

Here are the samples I prepared and tested, labeled respectively C-333, C-334, C-336, C-332, C-335. Samples C-332 and C-335 are within claim 12, and the rest of the samples are not. The last four samples are within the broad claims of the Armstrong patent; the first two are not. All the samples are within Becket's claims 9, 10, and 11. All of these steels are substantially non-magnetic and therefore have an austenitic structure. These samples have undergone severe cold work, yet none of them exhibit magnetism: therefore, they are all stably austenitic and non-magnetic after severe cold work. All of the tensile samples have about the same appearance; a material which had a markedly different property so far as deep drawing is concerned, would have a tensile property which would produce an entirely different appearing tensile sample.

(The samples referred to were received in evidence,
29 marked respectively "Plaintiff's Exhibit No. 5A,
5A', 5A'', 5B, 5B', 5B'', 5C', 5C'', 5D, 5D', 5D'', 5E,
5E' and 5E'' ").

(A certified copy of Armstrong patent No. 1,962,702, granted June 12, 1934, was offered and received in evidence, and marked "Plaintiff's Exhibit No. 6").

I cannot, from an examination of the physical properties of these steels, determine any marked difference in the properties of the steel covered by the Armstrong patent and the steel described and claimed by Becket, from the standpoint of stain resistance and deep drawing characteristics. Nor can I determine any marked difference in the structures of the materials when they are examined under the miscroscope.

Examination by the Court: I have examined these samples under a microscope and I have here a set of microscopic pictures which show that all the steels are practically all austenitic. The structural characteristics are all quite alike, and that is the austenitic type of structure.

(The set of pictures referred to was received in evidence and marked "Plaintiff's Exhibit No. 7").

Examination by Mr. Harrison continued: From the standpoint of deep drawing and stainlessness, I do not regard that the specific composition limits in claim No. 12 of

the Armstrong patent cover steel that is markedly different
from the steels falling within the broad range of the
Becket application. There is nothing striking or un-
30 usual about that specific composition as compared
with the larger group immediately surrounding it.

Cross-examination by Mr. Whitehead: Before the date of this application of Becket, it was known that a steel loses its stainless characteristic as the chromium content is dropped substantially below 16%; but it was not known that more than 22% chromium rendered the steel difficult to deep draw. It was not known prior to the date of the Becket application that 22% chromium was the desirable upper limit. Further, when this application was filed, there was not enough commercial background of knowledge of the low carbon, "18-8" steel, or any other low carbon chromium steel, to definitely establish the carbon range or to establish the desirability of the low carbon content for deep drawing purposes. It was known prior to the Becket application that the solid solubility of copper in steel was limited.

Redirect Examination by Mr. Harrison: In the "18-8" deep drawing steel, which was the only deep drawing stain-resistant material known before the time of the Becket invention involved in this action, the carbon content is kept at a moderately high figure in order to improve the deep drawing properties. With the somewhat higher carbon content, this material does not cold work to the same degree as the low carbon steel; therefore it was not obvious, so far as a chromium manganese steel of the type disclosed and claimed by Becket is concerned, that the carbon content should be maintained below 0.12% in order to increase the deep drawing ability.

31 **Frederick M. Becket** was called as a witness in his
own behalf and, being duly sworn, testified as follows:

Direct Examination by Mr. Harrison: I am the plaintiff, Frederick M. Becket, in this action. I am a metallurgist and have been connected with the art of metallurgy since 1896. During that time, and particularly since about 1902, I have been actively conducting and directing research in metallurgy. I have been most active in the field of the smelting of ores of the so-called "rare metals" or "semi-rare metals", and in the experimental work of making new steels. I have been interested in chromium steels since about 1903. My activities in metallurgy have resulted in over 100 patents on the subject. I am the author of about 15 to 18 technical articles on the subject of metallurgy. My activities in metallurgy have been recognized by the award of honors and distinctions by technical societies and universities. One of the highest honors I have received is the award of the Perkin Medal in 1925. I have been president of the Electro Chemical Society, and I have been president of the American Institute of Mining and Metallurgical Engineers. I have received the honorary degree of Doctor of Sciences from Columbia University and Doctor of Law from McGill University of Montreal. I am president of the Union Carbide and Carbon Research Laboratories. I am vice-president of the Electro Metallurgical Company, vice-president of the Union Carbide Company, and several others.

I first became interested in alloy steels containing iron, chromium, and manganese about 1912. I recall the date very well because of samples of this early work that I
32 keep on my desk in New York. My general object
in 1912 in making these steels was primarily to develop a material resistant to acid corrosion. I subsequently continued my researches with iron-chromium-manganese steels and about 1920 I was granted a patent on the result of these researches. In my work prior to the issuance of the patent in 1920 I had not discovered or come across any material, among the stain resistant iron-chromium-manganese alloys, which could be called a deep drawing material.

Some time after 1920, I commenced to search specifically for a deep drawing material having as a base iron, chromium, and manganese. At the time that I began the search for a deep drawing material, I had had considerable experience and considerable knowledge of the properties of iron-chromium-manganese steels, from my previous work. I was not able, on the basis of that knowledge, to predict whether or not I should be able to find a deep drawing material anywhere in the possible field of compositions of the iron-chromium-manganese series. There was not sufficient knowledge to enable one to make those predictions. The problem was particularly complicated because the effect was not known of the different possible additions which could be made to the iron-chromium-manganese steels. The fact that there are as many as six components in the steel involved in the present invention complicates the problem of predicting without experimentation what the properties of the material will be. As the number of ingredients in a steel is increased, the difficulty is vastly increased of predicting, in advance of actual physical test of the material, what the properties are going to be.

33 I have read Armstrong patent No. 1,962,702 which is Plaintiff's Exhibit No. 6, and I am familiar with the disclosure and the claims of the patent. Claim 12 in this action was copied from the Armstrong patent; and is claim 6 of that patent. I made an effort to insert in my application a claim broader than claim 12 in an effort to secure an interference with Mr. Armstrong on a broader basis than just this one claim. The Patent Office did not permit me to put in this broader claim, but stated that the decision was without prejudice to my right to present broader claims later if an intereference were granted on claim 12.

The results of Mr. Franks' investigation of samples of steels coming within the Armstrong patent, have been reported to me, and I draw the same conclusion that Mr. Franks did. I have heard Mr. Franks' testimony in this case and I agree with his conclusion that the materials disclosed and claimed by Armstrong, and the materials disclosed and claimed by me in this application, are the same kind of material, so far as deep drawing and stain resistance are concerned. I did not notice any misstatement of fact in all of Mr. Franks' testimony.

By Mr. Whitehead: No cross-examination.

(There was then offered and received in evidence and marked "Defendant's Exhibit No. 1" a folder containing copies of the references relied upon by the defendant, a copy of the decisions of the Board of Appeals, and a copy of the Statements of the Primary Examiner).

34 *By the Court:* "What I don't quite understand is the difference between the Armstrong patent and this. Armstrong was given a patent?"

By Mr. Whitehead: Armstrong was given a patent because in the opinion of the Examiner he had pointed out certain things which his product would accomplish, which could not have been foreseen from the prior references; whereas plaintiff here had not taught, in his specification, that the particular ranges specified by him had any marked or special value over and above the broader previously known range.

By the Court: "What do you say about this, Mr. Harrison?"

By Mr. Harrison: The plaintiff herein has disclosed in his application all the special properties called for by Armstrong's claims. The "stain-resistance and deep-drawing ability" disclosed by Becket necessarily imply the "resistance to acid corrosion or intergranular corrosion, machineability and forgeability" called for by Armstrong's claims. The "stable, non-magnetic condition" is an inherent characteristic of all chromium steels high in nickel and/or manganese, and is not surprising.

By the Court: "I can not quite see what the point is; both the Armstrong patent and this one called for a process of manufacturing steel by combining certain proportions of these different elements. Armstrong is the more specific, I suppose—that is, narrower, isn't it?"

35 *By Mr. Harrison:* Claim 6 is; but not the broader claims of the Armstrong patent.

By the Court: "Just what is the difference between your claim and Armstrong's?"

By Mr. Harrison: They overlap and almost coincide.

By the Court: "Just what is the difference in principle between your claim and the Armstrong claim?"

By Mr. Harrison: There is no difference in principle.

By the Court: "What, Mr. Whitehead, is the difference?"

By Mr. Whitehead: Armstrong limits his use of copper as compared to manganese. My understanding is that there is no such limitation found in Mr. Becket's specification. Armstrong pointed out in this application what he got by setting the lower limit of the manganese in equality with the copper and the upper limit not more than four times the copper. The differences between the Becket disclosure and the prior art disclosures are mere differences in degree which might have been expected; when Armstrong came along, he made a showing which convinced the Office that by adopting certain of the broader ranges of proportions, and particularly by specifying the particular relation of the copper to the manganese he had made an invention.

The foregoing is the substance of all of the evidence given on the hearing of this cause.

36 And upon the conclusion of the taking of the testimony and of the argument of said cause on the 7th day of February, 1936, the Court indicated that plaintiff's bill should be dismissed.

Be it remembered that on the 13th day of March, 1936, the defendant submitted to the Court proposed findings of fact and conclusions of law in the form in which the same appear elsewhere in this record as having been on that day made by the Court.

And be it remembered that the foregoing contains the substance of all the evidence given on the hearing of this cause necessary to the hearing on appeal, and this statement of evidence is duly stated, approved and signed and ordered to be made of record in the above-entitled cause this 20 day of April, 1936.

By the Court:

ALFRED A. WHEAT
Chief Justice

Approved:
Richard L. Scheffler, April 14, 1936.

Approved:
R. F. Whitehead, April 14, 1936.
Attorney for Defendant.

Pl. #1 *Becket* v. *Coe,* Eq. No. 56792.

390

---

37 Department of Commerce

United States Patent Office

Filed Apr 21 1936 Frank E. Cunningham, Clerk

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of the Specification, as originally filed, in the matter of the Pending Application of Frederick M. Becket, Filed December 18, 1930, Serial Number 503,328, for Improvement in Stain Resisting Alloys.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this Seventeenth day of January, in the year of our Lord one thousand nine hundred and thirty-six and of the Independence of the United States of America the one hundred and sixtieth.

CONWAY P. COE
Commissioner of Patents.

Attest:
D E WILSON
Chief of Division.

38 *Specification* 503,328

To All Whom It May Concern:

BE IT KNOWN That I, Frederick M. Becket, a citizen of United States residing at New York in the County of New York, and State of New York have invented certain new and useful improvements in STAIN RESISTING ALLOYS of which the following is a specification:

1.

39 This invention relates to alloys containing, as essential constituents, the metals iron, chromium, manganese and copper.

In an application bearing Serial No. 435,957, filed by me on March 14, 1930, I have described alloys consisting essentially of iron, chromium and manganese; and I have shown that within the limits of composition given in the said application, the alloys combine deep-drawing properties with high resistance to staining and corrosion, and exhibit this combination of properties not only when quenched from temperatures of about 1000° C to 1150° C, but also when air-cooled from like temperatures. The alloys discussed in my said prior application contain about 16% — 22% of chromium; about 5% — 15% of manganese; and up to about 0.3% of carbon. When the carbon is below about 0.12% the alloys are especially soft and ductile, but not quite so strong as when the carbon is higher. In the case of the alloys in which high ductility is desirable, the carbon is to be regarded as an impurity, and the carbon content is determined by the fact that the cost of the metal increases as the percentage of carbon diminishes. In commercial operations the presence of some carbon cannot be avoided.

I have now found that copper may be added to the alloys of my prior application giving new alloys with desirable properties. Such new alloys, when the copper content is suitably adjusted, are stain-resistant in approximately the

2.

same degree as the alloys of my prior application; and while the copper tends slightly to increase the hardness of the alloys, an appropriate addition of copper raises the Erichsen value and gives such a combination of physical properties as to indicate excellent deep-drawing qualities,—an inference which is confirmed by actual drawing tests.

By adding copper to the alloys of my prior application it is possible with a medium manganese content, say in the vicinity of 8%, to equal or, it seems probable, distinctly to surpass the drawing qualities obtainable without copper by incorporating a higher proportion of manganese. The present invention therefore offers the possibilities of providing still better alloys than those described in my prior application, and of lowering the cost of the alloys by replacing a part of the managanese with the cheaper metal, copper.

Although I have done a large amount of experimental work on the new alloys, it has not been feasible to test all possible compositions, and it is deemed unsafe in this field to permit the conclusions to wander far from the experimental basis. I therefore refrain from setting precise limits on the additions of copper which may be useful. Such limits are not of the essence of the invention, and in practice limiting values of the copper content would be avoided in view of the impossibility in even the best metallurgical practice of working to precise limits. With this qualification it may be said that the useful copper range lies between the approximate limits of 0.25% and 2.5%. When the copper content is too high, the alloy tends to
41 become hot-short. With the manganese at 8% or
less, the copper may rise to 2.5% and perhaps beyond, but with higher manganese percentages, in the vicinity of 14%, 2.5% of copper seems to be excessive, or at least not to be recommended. Alloys containing 3% of copper with as little as 6% of manganese were definitely hot-short, and broke up during forging.

As stated above, the chromium may be varied through about the range (16%-22%) given in my prior application, but my experimental work has been largely confined to compositions containing about 18% of chromium, it having been established in prior work with iron-chromium, iron-chromium-nickel, and iron-chromium-manganese alloys that a chromium percentage not far from this value is in most cases quite satisfactory, and found in the present investigation that about 18% of chromium is equally satisfactory in the copper-containing alloys.

The carbon percentages set out in my prior application, viz. not more than about 0.3%, and preferably not more than 0.12 are also recommended for the iron-chromium-manganese copper alloys of deep-drawing quality. Where maximum workability is not required, the carbon may rise to at least 1.0%.

The following tabulation shows the composition of specific alloys within my invention, and gives the numbers obtained in physical tests carried out on the respective alloys as quenched from 1050°–1150° C:

42

C	Cr	Mn	Cu	Yield point	Max. stress	Elongation in 2 in.	Reduction of area	Erichsen	Brinell
0.10	17.20	9.78	0.52	47,000	116,000	40.0%	38.8	11.4	179
0.08	19.25	8.68	1.10	47,000	127,000	40.5	41.0	10.8	179
0.12	17.07	8.69	1.12	52,300	106,600	47.0	58.0	11.4	179
0.10	16.83	8.31	1.64	43,000	111,000	40.0	42.5	11.1	163
0.09	16.86	8.64	2.12	48,900	89,900	45.5	59.7	10.6	163
0.10	17.50	8.50	2.50	54,000	92,000	48.0	70.7	10.4	159

As in the case of the alloys of application Serial No. 435,957 the chromium percentages which appear most promising fall between the approximate limits of 17% and 21%. Since the addition of copper permits the manganese percentage to be lowered, the preferred range for manganese in the copper-containing alloys is defined by the approximate limits 6% and 10%.

I have also discovered that by incorporating a substantial proportion of nickel, not less than 2%, with alloys of the type described above, the properties are still further improved; and certain of the resulting compositions are at least equal in workability and stain-resistance to the best comparable irons or steels which have come to my attention. As nickel is added, the manganese content may be correspondingly lowered, but I prefer to have at least about 3% of manganese present. A chromium content of about 18% is most favorable to the ductility of the alloy, and with such a chromium content, the sum of the nickel and manganese percentages should be at least 6%, and at least 8% if the ductility is to be raised to nearly its maximum value.

Increasing the sum of the nickel and manganese beyond
42½ 14% does not, as a rule, improve the properties sufficiently to warrant the additional cost involved. When the chromium content varies much in either direction from 18%, the alloy tends to become less workable,—a tendency which can be counteracted in some measure by adding more manganese and/or nickel.

The following table shows certain of the physical properties of typical iron-chromium-manganese-nickel-copper alloys, and of comparable alloys free from copper. The alloys were prepared for testing by quenching them from 1150° C. Similar properties can be developed by air-cooling from temperatures within the range 1000° C to 1150° C.

	1	2	3	4	5	6	7	8
C	0.07%	0.09%	0.24%	0.08%	0.10%	0.13%	0.12%	0.09%
Cr	17.75″	18.54″	18.75″	18.30″	22.17″	21.89″	12.54″	11.96″
Mn	5.30″	6.54″	6.27″	6.70″	6.15″	6.26″	6.12″	5.91″
Ni	4.37″	2.22″	4.38″	2.30″	5.73″	5.88″	6.29″	6.16″
Cu	1.02″	1.10″	1.38″	None	1.39″	None	0.64″	None
Yield Point	40*	49	45	42	41	48	38	30
Max. Stress	100*	88.5	100	150	86	96	100	118
Elongation in 2 in.	62%	53%	66%	37%	59%	55%	53%	26%
Reduction of area	68%	73%	71%	40%	72%	64%	51%	31%
Erichsen	12	11	11.5	11	11	10	12	11
Brinell	131	156	163	179	128	159	156	179

*The unit employed for expressing yield point and maximum stress in the above table is 1000 lb. per square inch.

43 Alloys No. 1 and No. 2 are low-carbon alloys embraced within the invention, No. 2 being low in nickel and proportionately high in manganese. Alloy No. 3 is similar to No. 1 but contains 0.24% of carbon. The ductility is nevertheless excellent. Alloy No. 4 may be regarded as alloy No. 2 with the copper omitted. The ductility is greatly lowered and the hardness is increased. Alloys No. 5 and No. 7 are copper-containing alloys respectively high and low in chromium, while alloys No. 6 and No. 8 are corresponding alloys free from copper.

The tendency of copper to produce hot-shortness is slightly diminished by the presence of nickel, and with the most favorable composition, the alloys can be hot-worked when the copper content is as high as 2.75%. When hot-working is not contemplated, the copper may rise to 5%. The effect of carbon is nearly the same in the nickel-containing and nickel-free compositions.

This application is a continuation in part of Serial No. 444,876, filed April 16, 1930.

44 I claim:—

1. A stain-resisting iron-base alloy containing chromium about 16% to 22%; manganese about 5% to 15%; and a substantial proportion of copper.

2. A stain-resisting iron-base alloy containing chromium about 16% to 22%; manganese about 5% to 15%; and copper about 0.25% to 3.0%.

3. A stain-resisting iron-base alloy having deep-drawing properties and containing chromium about 16% to 22%; manganese about 5% to 15%; copper about 0.25% to 2.5%; and not more than 0.3% of carbon.

4. A stain-resistingg iron-base alloy having deep-drawn properties and containing chromium about 16% to 22%; manganese about 5% to 15%; copper about 0.25% to 2.5%; and not more than 0.12% of carbon.

5. A stain-resisting iron-base alloy having deep-drawing properties and containing chromium about 16% to 22%; manganese about 6% to 10%; copper about 0.25% to 2.5%; and not more than 0.12% of carbon.

6. A stain-resisting iron-base alloy having deep-drawing properties and containing chromium about 17% to 21%; manganese about 6% to 10%; copper about 0.25% to 2.5%; and not more than 0.12% of carbon.

45 7. A stain-resisting iron-base alloy having deep-drawing properties, said alloy containing 16% to 22% of chromium, 0.25% to 2.75% of copper, and not more than 0.3% of carbon; and containing also at least 3% of manganese and at least 2% of nickel, with the sum of the manganese and nickel percentages falling between 6% and 14%.

8. A stain-resisting iron-base alloy having deep-drawing properties, said alloy containing 16% to 22% of chromium, 0.25% to 2.75% of copper, and not more than 0.12% of carbon; and containing also at least 3% of manganese and at least 2% of nickel, with the sum of the manganese and nickel percentages falling between 8% and 14%.

46 In Testimony Whereof, I affix my signature.

FREDERICK M. BECKET

47 Endorsed: Compared by M. H.; Entered in 166,788; Date 1/16/36.

48 BECKET v. COE

Equity No. 56792

Plaintiffs exhibit No.

49 Def. No. 1. Becket v. Coe. Eq. No. 56792

Becket v. *Coe.*

Equity No. 56,792

Filed April 21, 1936, Frank E. Cunningham, Clerk

A—Armstrong	1,962,702
B—Greaves et al., British	117,286
C—Hadfield, British	313,471
D—Hadfield, French	590,691
E—Commentry, French	666,789

F—Statement of Examiner, dated March 20, 1933

G—Statement of Examiner, dated February 9, 1935.

H—Decision of Board of Appeals, dated August 12, 1933

I—Decision of Board of Appeals, dated June 7, 1935.

Patented June 12, 1934 **1,962,702**

UNITED STATES PATENT OFFICE

1,962,702

CORROSION RESISTANT FERROUS ALLOY COMPRISING CHROMIUM, NICKEL, MANGANESE AND COPPER

Percy A. E. Armstrong, Beverly Hills, Calif.

No Drawing. Application December 14, 1933, Serial No. 702,417

8 Claims. (Cl. 75—1)

This application relates to ferrous alloys containing chromium and nickel, which alloys also contain other ingredients in novel proportions which give to the alloys unusual and valuable characteristics not heretofore attainable. This application is a continuation in part of my earlier application, Ser. No. 532,125, filed April 22, 1931.

Alloys of iron with chromium and nickel are now used extensively and the commonest formula for such alloys is the one containing about 18% chromium and about 8% nickel, but other proportions are also used. In the modified alloys the chromium range will lie between about 12% and 30% and more commonly between about 15% and 25%; as regards the nickel range, it may run upward to as much as 30%, though for purpose of economy it ordinarily will be kept below about 18%. At the low end at least about 8% of nickel is the minimum desirable quantity, but in giving this limit I mean to imply that melting ranges may be permitted such as are found in the commercial production of the "18 and 8" alloy where the nickel usually ranges upward from a point above 7%. Ordinarily when the carbon is low the nickel will be increased with the chromium but this is not always the case. Alloys of this general class have very valuable characteristics as regards corrosion resistance and toughness, but it is recognized that they have certain weaknesses as, for example, in their resistance to corrosion by sulphuric acid, and particularly to what is known as intergranular corrosion evidenced by the copper sulphate test, especially when the alloy has been reheated to comparatively low temperatures in the order of 1250° F. or an equivalent phase change brought about by cold working. Also it is recognized that while these alloys are austenitic or of the gamma phase when heat-treated, that is, quenched from a high temperature, and therefore non-magnetic, they are not stable in this condition and when they are transformed into the magnetic condition (as by cold working) their corrosion resistance will be materially reduced. Also due to their tendency to develop mechanical martensite (involving a change of phase to alpha) they offer great resistance to machining.

I have discovered that if there is added to a ferrous alloy of the chromium-nickel type, properly proportioned and adjusted amounts of copper and manganese, the alloy will retain the ready forgeability in excess of the corresponding iron-chromium-nickel alloy and will be stable austenite (that is so-called stable gamma) so that it will remain non-magnetic even to the point where it is cold worked sufficiently to give a wear-hard surface. This same stability of the austenitic or gamma phase will prevent the development of mechanical martensite or alpha phase so that the alloy can be readily turned, sawed or otherwise machined.

It will also be found that the resistance of my alloy to the action of sulphuric acid is increased phenomenally and its resistance to intergranular corrosion has been enormously increased. This latter feature is a very surprising factor for manganese certainly does not improve the intergranular corrosion and apparently lowers it, and the action of copper alone in this regard is very slight and practically negligible; copper and manganese additions will not produce my results unless the copper and manganese content have a definite relationship to one another.

The improvement in intergranular corrosion first is observed at the point where the manganese is about equal to the copper and as the manganese proportion is increased becomes more and more noticeable. Thus decidedly improved results are obtained when the manganese to copper proportion is at least 4:3 and even a better resistance is obtained when this proportion is 3:2 or higher. The copper must not be less than about 1% and preferably is over 1.3% and under about 3%. The manganese ordinarily will range from about 2% to about 8%. If resistance to intergranular corrosion is not of vital importance, the manganese range relative to copper may be wider, say, ranging from about equal to the copper up to about 12%, but the high manganese will add to the expense and instead of giving any commensurate benefit will tend to give a predominant manganese result which is detrimental, though even up to approximately the figure of 12% manganese my alloy will show a resistance to sulphuric acid far greater than would be expected from the known effects of copper or manganese alone.

While the lower ranges of manganese within my proportions (that is, where the manganese approaches equality with the copper) have somewhat less resistance to intergranular corrosion than the higher percentages, nevertheless, they have a better resistance in this direction than corresponding alloys of chromium and nickel without the manganese and copper and have the further advantage of definitely improved resistance to scaling at high temperatures, say between 1600° F. and 1800° F., and this is true even though the silicon content is kept low. Thus even without high silicon, steel embraced within the pres-

ent invention has definite advantages and uses in the field of valves for internal combustion engines.

An understanding of the use of my invention can well be had from working ranges of copper and manganese to be used in conjunction with a standard steel containing about 18% chromium and about 8% nickel with low carbon (about .15% or lower, as indicated by current methods of determination) and low silicon. In such case, the best analysis will include copper from 1½% to about 3% and manganese from 4% to 6%. If intergranular corrosion is not so important and resistance is to be had against sulphuric or nitric acids or against scaling at high temperatures, the manganese may be from 2% to 4% and the copper from 1½% to about 2.5%.

As the manganese increases above 6%, it will be found that maximum precipitation by drawing at about 1250° F. for long periods will produce slight magnetism, but these same alloys will be austenitic when quenched from 1950° F. to 2000° F. and will remain stable austenite even under severe cold work. Above about 8% of manganese there is a slight falling off of resistance to intergranular corrosion, even though the copper is kept to the upper limits, as is desirable with the higher manganese, and for this purpose the manganese should not be more than 3 times the copper. It is not feasible to increase the copper proportionate to increases in the manganese because if the copper is brought above about 3% the alloy will not forge and also it will become magnetic. Accordingly for my purposes I prefer to keep the manganese maximum at 8% though this may be permitted to range up to 12% where resistance to sulphuric acid and to scaling at high temperatures is more important than resistance to intergranular corrosion. In such case the manganese should not exceed substantially four times the copper.

The following are specific analyses of alloys of this class:

Carbon	Chromium	Nickel	Manganese	Copper	Silicon
.10	17.46	8.25	4.61	2.9	.31
.08	17.46	8.25	5.93	2.9	.39
.10	17.52	8.25	3.10	2.9	.36
.10	17.35	8.17	3.09	1.3	.26
.10	17.14	8.17	2.95	2.9	.39
.12	18.83	7.42	3.84	2.2	.42
.11	18.18	7.39	3.24	1.9	.38

In addition to these analyses the following give approximate analyses showing other relationships of chromium and nickel. It is understood that in each of these the carbon content is preferably low:

Chromium	Nickel	Manganese	Copper
12	10	6	3
15	8	4	2
15	8	4	3
15	10	4	3
15	8	8	3
20	9	6	3
25	15	8	3
28	17	7	2.5
30	25	8	3

High melting point elements such as tantalum, columbium, vanadium, molybdenum, tungsten, titanium and zirconium may be used in small quantities to give varying physical characteristics normally resulting from their use. Also the inclusion of fractional percentages of sulphur or selenium may somewhat improve the machineability. The carbon content of my alloy ordinarily is low—preferably under .15% but may range up to about .30% and will only exceed this figure if intergranular corrosion and forgeability are to be sacrificed in the interest of hardness as in the case of valves, in which case a substantially higher carbon content may be employed. For the purpose of this alloy the silicon will ordinarily be low, as within the ordinary ranges encountered in steel making practice and under about 1.00%.

My alloy has a tightly adhering scale quite different from the light, fluffy type common to the regular chromium-nickel alloys of the usual type referred to, and this scale gives to my alloy excellent resistance to elevated temperatures up until a point of about 1600° to 1800° is reached when the efficiency begins to fall off, due to the progressive scaling action, though even at these temperatures the resistance to intergranular corrosion is still of great benefit. However, by increasing the silicon or aluminum content somewhat the resistance to scaling at high temperatures is improved and an alloy can be obtained having a scale which will remain practically unchanged even at very high temperatures ranging up to the order of about 1800° F. to 2000° F., provided the temperature does not approach within about 200° F. of the transformation point of the particular alloy. Further, if the silicon or aluminum content is not unduly increased there will be an improvement in resistance to intergranular corrosion as compared with a corresponding steel not having the manganese and copper content so that a valve of my steel with the increased silicon or aluminum content is particularly advantageous for use in high compression engines where it must withstand the action of gases which result from the combustion of gasoline which has been treated with tetraethyl lead. However, it must be borne in mind that even at these high temperatures the resistance of the valve is dependent upon the maintenance of the non-porous scale, and if this is ruptured a high silicon or aluminum content will make the valve subjected to intergranular corrosive action, and if operated at lower temperatures a high silicon content may readily set up a mechanical weakness due to heavy grain boundary precipitate; whereas, when the silicon is low the alloy at these lower temperatures of about 1000° F. to 1500° F. does not suffer from a grain weakening precipitate, although a precipitate does exist of a very unusual type, that is highly non-corrosive. For uses where intergranular corrosion resistance or weakness is not of importance, but high temperatures are to be met, the silicon may range up to about 3%.

In the foregoing analyses the iron content is not included, but it is of course understood that subject to the additions of comparatively small quantities of various elements as stated above and subject to the presence of small quantities of other elements such as the impurities found in steels, the balance is iron. Accordingly to cover this situation, I may state that in addition to the elements named in the analyses the balance is "substantially all iron".

What I claim is:

1. A stable surface ferrous alloy characterized by its resistance to sulphuric acid, resistance to phase change when quenched from high temperature and submitted to severe cold work, and resistance to intergranular corrosion when subjected to maximum precipitation, and of good

forgeability and machineability, comprising chromium about 12% to 30%, nickel ranging upward from at least about 8% to 30%, copper between about 1% and 3%, manganese between about 2% and 12% but at least equal to the copper, but not substantially more than four times the copper, silicon less than 3%, and the balance substantially all iron.

2. An alloy as specified in claim 1 in which the nickel content ranges from at least about 8% to 25%.

3. An alloy as specified in claim 1, in which the copper content is between 1.3% and about 3% and the manganese content is between about 2% and 8% and is substantially in excess of the copper.

4. A ferrous alloy characterized by its stability in the gamma phase, its resistance to intergranular and acid corrosion and its forgeability and machineability, comprising chromium about 12% to 25%, nickel ranging up from at least about 8% to 18%, copper between about 1% and 3%, manganese about 2% to 8%, the ratio of manganese to copper being not less than 4 : 3 or more than 3 : 1 and silicon less than 1%, with the balance substantially all iron.

5. A ferrous alloy characterized by its stability in the gamma phase, its resistance to intergranular and acid corrosion and its forgeability and machineability, comprising chromium about 12% to 25%, nickel ranging up from at least about 8% to 18%, copper between about 1% and 3%, manganese about 2% to 8%, but exceeding the copper in the ratio of at least about 3 : 2 and not by more than about 3 : 1, carbon not over about .30%, and silicon less than 1%, the balance being substantially all iron.

6. A ferrous alloy characterized by its resistance to acid corrosion or intergranular corrosion, by its machineability and forgeability and its stable non-magnetic condition comprising chromium about 18%, nickel about 8%, copper about 1.5% to 3%, manganese about 4% to 6%, carbon not substantially above about .15% and silicon less than 1%, the balance being substantially all iron.

7. A ferrous alloy characterized by its resistance to the action of sulphuric or nitric acid, by its machineability and forgeability and its stable non-magnetic condition, comprising chromium about 18%, nickel about 8%, copper about 1.5% to 2.5%, manganese about 2% to 4% and in excess of the copper, carbon not substantially above about .15% and silicon less than 1%, the balance being substantially all iron.

8. A stable surface ferrous alloy characterized by its resistance to sulphuric acid, resistance to phase change when quenched from high temperatures and submitted to severe cold work, and resistance to intergranular corrosion when subjected to maximum precipitation, and of good forgeability and machineability comprising chromium from about 12% to about 30%, nickel ranging upward from above about 7% to about 18%, copper between about 1% and about 3%, manganese between about 2% and 12% in excess of the copper but not substantially more than four times the copper and the balance being substantially all iron.

PERCY A. E. ARMSTRONG.

COMPLETE SPECIFICATION.

Improvements in the Manufacture of Steel.

We, **Henry Arnold Greaves**, Electrical Engineer, of 25, Raven Road, Nether Edge, and **Harry Etchells**, B.Met., Metallurgical Engineer, of 231, Oakbrook Road, both of Sheffield, in the County of York, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Our invention relates to the manufacture of steel and consists in improving the composition and physical properties of steels of the plain carbon class containing only small proportions of alloyed elements and steels which are specially alloyed with such elements as nickel, chromium, vanadium, and other special elements by the addition by the processes hereinafter described of two to fifteen *per cent.* of manganese, in such a manner that the finishing carbon in the steel does not exceed 0.40 *per cent.* The particular classes of steels to which our invention is applicable are:—

(1) Steels consisting mainly of iron with traces of other elements.

(2) Steels known as rustless or stainless containing 5% to 20% of chrome.

(3) Steels used for armament protective work containing up to 7% nickel and 5% chrome.

(4) Steels used for motor and aircraft work containing up to 25% nickel, 10% chrome and 2% vanadium.

According to our invention the maganese is introduced into the steel either by reducing manganese from manganese ore in an electric furnace during the ordinary process of steel making, in which case ferro manganese is added to the liquid steel and the excess of carbon is reduced by oxidising it into the form of carbonaceous gas by means of manganese oxides which may be in the form of manganiferous ores; or alternatively there may be added to the liquid steel, ferro manganese which has been separately refined in an electric furnace with maganese oxides in any suitable form so that the carbon contents of the ferro manganese are reduced within such limits that they will not increase the carbon in the finished steel beyond the desired percentage (*viz.* .40%); or a further means which we adopt is to add to the slag which covers the liquid steel in the furnace, manganese ore, and treat with finely divided carbon, in order to reduce elementary manganese from the ore and pass it into the steel.

We wish it to be understood that by the term "ferro manganese" we mean all commercially known alloys containing iron and maganese together with varying proportions of carbon and silicon.

The addition of manganese by the processes herein described and within the proportions named makes possible the use of smaller quantities of special metals such as nickel, chrome, and vanadium, and since manganese is less expensive than those metals, economy in production is thereby effected.

It should be understood that such substitution is not strictly quantitative in that one *per cent.* of manganese will substitute one *per cent.* of the special alloyed metals referred to, but that a predetermined amount of manganese may be alloyed with the steel, and the percentage of one or more of the specially alloyed elements be substantially reduced, without varying the physical features of the steel to any marked extent.

The addition of manganese in the manner herein described to plain carbon steels with less than 0.40 carbon produces new classes of steel, specially suitable where considerable toughness is required combined with ductility.

In the case of very low carbon steel, if rolled into plates or sheets, a metal

with a very smooth surface is produced, which is very useful for ship plates as it would give rise to much less friction than the ordinary quality of such plates.

For parts of electrical machinery a non-magnetic but exceedingly tough steel can be produced.

Further, the addition of manganese by the processes herein described and in the proportions named to alloy steels, produces a new series of air and oil hardening steels, and for protective armour gives greater strength for less weight, and the same characteristic also applies to armour piercing steels.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

In steels of the plain carbon class containing only small proportions of alloyed elements, and in steels which are specially alloyed with such elements as nickel, chromium vanadium and other special elements, a process for adding two to fifteen *per cent.* of manganese without increasing the finishing carbon beyond .40 *per cent.* in the steel: consisting of (1) adding ferro manganese to the steel while in its liquid condition and reducing the excess of carbon by oxidising it into the form of carbonaceous gas by means of manganese oxides, which may be in the form of manganiferous ores; or (2) adding to the steel while in its liquid condition, ferro manganese which has been separately refined in an electric furnace with manganese oxides in any suitable form so that the carbon contents of the ferro manganese are reduced within such limits that they will not increase the carbon in the finished steel beyond the desired percentage (*viz*: .40%); or (3) adding to the slag which covers the liquid steel in the furnace, manganese ore and treating with finely divided carbon in order to reduce elementary manganese from the ore and pass it into the steel.

Dated this 7th day of December, 1917.

R. HEBER RADFORD, SON & SQUIRE,
Agents for the Applicants,
15, Saint James' Row, Sheffield.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1918.

43

Sa Lit, Nrun Sec

PATENT SPECIFICATION

Application Date: March 10, 1928. No. 7489/28.

313,471

Complete Left: Dec. 10, 1928.

Complete Accepted: June 10, 1929.

PROVISIONAL SPECIFICATION.

Improvements in or relating to Alloys.

I, Sir Robert Abbott Hadfield, Bart., F.R.S., of 22, Carlton House Terrace, in the City of Westminster, a British Subject, do hereby declare the nature of this invention to be as follows:—

This invention has reference to improvements in alloys capable of offering resistance to corrosion by acid. Various alloys have heretofore been proposed possessing this characteristic in varying degrees and the present invention has for its object to produce alloys possessing the characteristic referred to in an enhanced degree, and also other characteristics, including ductility and strength, adapted to render them available for various industrial uses.

For this purpose, an alloy steel according to the invention, contains, in addition to iron, from about 0.05 to 1% of carbon, from about 2 to 22% of nickel, from about 10 to 30% of chromium, from about 1 to 10% of tungsten and from about 0.20 to 5% of copper, with, it may be, appreciable percentages of silicon and manganese, say from about 0.05 to 4% of silicon and 0.25 to 4% of manganese. The percentages of the various elements contained in alloys according to the invention, may vary considerably within the limits mentioned, the combined chromium and nickel content being from about 18 to 32%.

The following are analyses of some examples of the alloys that have been found by experiment, to offer excellent resistance to corrosion by acids, both hot and cold, and to other chemicals, for instance a solution of ammonic chloride, and which moreover possess considerable strength and toughness and are capable of being readily worked to convert them into articles of different shapes to adapt them for use in industries of various kinds.

1. Carbon about 0.40%, nickel about 7.00%, chromium about 20.1%, tungsten about 4.36% and copper about 2%, with about 1.45% of silicon and about 0.53% of manganese.
2. Carbon about 0.20%, nickel about 10.2%, chromium about 16.1%, tungsten about 1.37% and copper about 2%, with about 0.35% of silicon and about 0.39% of manganese.
3. Carbon about 0.22%, nickel about 7.3%, chromium about 16.2%, tungsten about 1.87% and copper about 1.90% with about 0.28% of silicon and about 0.10% of manganese.
4. Carbon about 0.06%, nickel about 19.8%, chromium about 10.1%, tungsten about 1.94% and copper about 1.81%, with about 0.14% of silicon and about 0.52% of manganese.

Dated this 10th day of March, 1928.
For the Applicant,
LLOYD WISE & Co.,
10, New Court, Lincoln's Inn, London, W.C. 2.
Chartered Patent Agents.

COMPLETE SPECIFICATION.

Improvements in or relating to Alloys.

I, Sir Robert Abbott Hadfield, Bart., F.R.S., of 22, Carlton House Terrace, in the City of Westminster, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has reference to improvements in alloys capable of offering resistance to corrosion by acids and other chemical agents and also to oxidation, scaling and corrosion at high temperatures. Various alloys have heretofore been proposed possessing these characteristics in varying degrees and the present invention has for its object to produce alloys possessing the characteristics referred to in an enhanced degree, and also other characteristics, including ductility and strength, adapted to render them available for various industrial uses.

For these purposes, an alloy according to the present invention has as its prin-

[*Price* 1/-]

cipal ingredients, iron, carbon, chromium nickel, tungsten and copper, the combined nickel and chromium content being from about 18 to 32% with the nickel from about 2% upward but less than 20% and the chromium being from about 5 to 30%.

Such an alloy may advantageously contain, in addition to iron, from about 0.05 to 1% of carbon, from about 2 upward but less than 20% of nickel, from about 5 to 30% of chromium, from about 1 to 10% of tungsten and from about 0.20 to 5% of copper, with it may be, appreciable percentages of silicon and manganese, say from about 0.05 to 4% of silicon and 0.10 to 4% of manganese. The percentages of the various elements contained in alloys according to the invention, may vary considerably within the limits mentioned, the combined chromium and nickel content however being from about 18 to 32% as above stated.

The following are analyses of some examples of the alloys that have been found, by experiment, to offer excellent resistance to corrosion by acids, both hot and cold, and to other chemicals, for instance a solution of ammonic chloride, and also to oxidation, scaling and corrosion at high temperatures, and which moreover possess considerable strength and toughness and are capable of being readily worked to convert them into articles of different shapes to adapt them for use in industries of various kinds.

1. Carbon about 0.40%, nickel about 7.00%, chromium about 20.1%, tungsten about 4.36% and copper about 2%, with about 1.45% of silicon and about 0.53% of manganese, the remainder being principally iron.

2. Carbon about 0.20%, nickel about 10.2%, chromium about 16.1%, tungsten about 1.37% and copper about 2%, with about 0.35% of silicon and about 0.39% of manganese, the remainder being principally iron.

3. Carbon about 0.22%, nickel about 7.3%, chromium about 16.2%, tungsten about 1.87% and copper about 1.90% with about 0.28% of silicon and about 0.10% of manganese, the remainder being principally iron.

4. Carbon about 0.06%, nickel about 19.8%, chromium about 10.1%, tungsten about 1.94% and copper about 1.81%, with about 0.14% of silicon and about 0.52% of manganese, the remainder being principally iron.

Example No. 1 is typical of an alloy offering the best resistance to oxidation, scaling and corrosion at high temperatures, while Example No. 4 is typical of an alloy offering the best resistance to corrosion by acids and other chemical agents.

As molybdenum is the equivalent of tungsten in the above mentioned alloys, it is to be understood that this element is included in the term tungsten in the appended claims.

Other elements, such for example as cobalt, vanadium, titanium or aluminium, or two or more of such elements, usually in small percentages, say from about 0.5 up to 6%, may, in some cases, also be included in alloys according to the present invention for improving their qualities in certain respects to meet special requirements.

Alloys of the kind hereinbefore described can be used for various purposes and in the construction of apparatus or devices of various kinds.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An alloy having as its principal ingredients, iron, carbon, chromium, nickel, tungsten and copper, the combined chromium and nickel content being from about 18 to 32%, with the nickel from about 2 upward but less than 20%, and the chromium from about 5 to 30%, the said alloy being capable of offering considerable resistance to corrosion by acids and other chemical agents and also to oxidation, scaling and corrosion at high temperatures.

2. An alloy according to the preceding claim, comprising in addition to iron, carbon from about 0.05 to 1%, nickel from about 2 upward but less than 20%, chromium from about 5 to 30%, tungsten from about 1 to 10% and copper from about 0.20 to 5%, the combined chromium and nickel content being from about 18 to 32%.

3. An alloy according to claim 1, or claim 2, containing appreciable percentages of silicon and manganese.

4. An alloy according to claim 3, wherein the percentage of silicon is from about 0.05 to 4% and manganese from about 0.10 to 4%.

5. The several alloys containing, in addition to iron, carbon, nickel, chromium, tungsten, copper, silicon and manganese substantially in or about the percentages hereinbefore described with reference to the examples numbered 1 to 4 respectively.

Dated this 10th day of December, 1928.
For the Applicant,
LLOYD WISE & Co.,
10, New Court, Lincoln's Inn, London,
W.C. 2,
Chartered Patent Agents.

Redhill. Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1929.

57 In the Supreme Court of the District of Columbia

No. 56,792 In Equity

Frederick M. Becket, *Plaintiff*,

vs.

Conway P. Coe, Commissioner of Patents, *Defendant*.

Stipulation as to Translations of French Patent Citations

It is hereby stipulated by and between counsel for the respective parties hereto that the attached translations into English of French patents numbers

590,691; R. A. Hadfield; "Improvements in Alloys", issued March 23, 1925; and

666,789; Commentry, Fourchambault et Decazeville, S. A.; "Alloy Uniting Improved Mechanical Properties With a Great Resistance to the Action of Corrosive Agents"; issued May 28, 1929;

be accepted and used in the trial of this cause in lieu of copies of said French patents.
Dated: January 7, 1936.

RICHARD L. SCHEFFLER
Solicitor for Plaintiff.

R. F. WHITEHEAD
Solicitor for Defendant.

SO ORDERED
January , 1936.

Judge of the Supreme Court of the District of Columbia

58 FRENCH PATENT 590,691 Issued March 23, 1925

R. A. HADFIELD Filed December 24, 1924

IMPROVEMENTS IN ALLOYS

This invention relates to the production of alloys which are capable of offering considerable resistance to oxidation and scaling at high temperatures and to attack by flame and hot products of combustion, such as those produced in furnaces of various kinds and in internal combustion engines, as well as to corrosion by air, fresh water, sea water and various acids and other agents ordinarily attacking iron or steel, and which also possess good mechanical properties, including a high tensile and compression strength both at high temperatures and at ordinary temperatures.

Various alloys of nickel and chromium possessing to various degrees the above mentioned characteristics have heretofore been proposed, but the object of the present invention is to provide alloys possessing these characteristics to a higher degree.

For this purpose, an alloy according to the invention contains, in addition to iron, carbon up to about 1%, manganese up to about 8%, from about 5% to about 25% of chromium, from about 5% to about 20% of nickel and from about 1% to about 10% of silicon with, it may be, either from 1% to 10% of tungsten (or of its equivalent molybdenum), or up to about 6% of copper, or both of these elements together.

It is found that an alloy of this sort possesses a great resistance to corrosion, properties of resistance to scaling and a great mechanical strength at elevated temperatures, so that it is specially suitable for the fabrication of various furnace elements or other parts exposed to elevated temperatures under oxidizing conditions and in the case where the furnace contains appreciable quantities of sulfur-bearing gas. Its mechanical strength at elevated temperatures and its properties of resistance to scaling render it proper also for use for the construction of valves and other parts of internal combustion motors. It is specially suitable for the fabrication of turbine blades and other machine parts for which a high resistance to corrosion is desirable, and its non-oxidizable nature makes of it an appropriate material for general use in the cases where a material of this nature is desirable, especially when a metallic material is needed which effectively resists corrosion by sea water. It is found that the presence of silicon in the alloy gives to it in a marked degree the property to augment the resistance of the alloy to oxidation at elevated temperatures and it is thought that the presence of manganese also gives to it the same property, but to a smaller degree. For many applications the alloy may contain from about 0.5% to about 2%

of silicon and from about 6% to about 8% of nickel, in addition to the other elements mentioned.

Hereinafter will be given three specific examples of alloys of the above-mentioned sort containing silicon in addition to iron, carbon, manganese, chromium and nickel:

59 Example 1.—Carbon about 0.26%; silicon about 1.33%; manganese about 0.63%; chromium about 22.20% and nickel about 7.52%.

Example 2.—Carbon about 0.13%; silicon about 0.53%; manganese about 2.56%; chromium about 20.10%; and nickel about 7.54%.

Example 3.—Carbon about 0.37%; silicon about 1.55%; manganese about 0.65%; chromium about 19.6%; and nickel about 7.75%.

It has been found that each of these alloys possesses excellent properties of resistance to scaling when it is submitted to the action of oxidizing gas at high temperatures, as well as a great mechanical strength and a great tenacity at elevated temperatures and, at ordinary temperatures, excellent properties of resistance to corrosion by air, fresh water and sea water. It has also been found that each of these possesses an effective resistance to the action of a boiling 0.5% solution of sulfurous acid.

For certain applications, particularly when there is required a particularly high mechanical strength at high temperatures, the alloy may also contain tungsten or its equivalent molybdenum. Hereinafter will be given an example of an alloy of the above mentioned sort containing tungsten in addition to silicon.

Example 4.—Carbon about 0.51%; silicon about 1.81%; manganese about 0.42%; chromium about 20.80%; nickel about 6.82%; and tungsten about 3.93%.

The example which follows is that of an alloy of the above mentioned sort containing copper in addition to silicon and tungsten.

Example 5.—Carbon about 0.26%; silicon about 1.31%; manganese about 0.39%; chromium about 21.3%; nickel about 7.28%; tungsten about 4.76%; and copper about 2.07%.

Other elements such as, for example, cobalt, vanadium, titanium or aluminum or two or more than two elements of this sort, usually in slight percentages, for example up to

6%, may also, in certain cases, be incorporated in the alloys according to the present invention in order to improve their properties to some extent to meet special conditions.

Résumé

The invention comprises:

As new industrial products:

First—Alloys and articles fabricated with the aid of these alloys which are capable of offering a considerable resistance to oxidation and to scaling at elevated temperatures and to the attack by flame and hot products of combustion such as those produced in furnaces of different sorts and in internal combustion motors, as well as a considerable resistance to the action of air, of fresh water, of sea water and of various acids and other agents ordinarily attacking iron and steel, and which possess also a high tensile and compression strength, both at elevated temperatures and at ordinary temperatures, these alloys being characterized by the fact that they contain, in addition to iron, carbon up to about 1%, manganese up to about 8%, from 5% to 25% of chromium, from about 5% to about 20% of nickel and from about 0.5% to about 10% of silicon, these alloys being able also to contain either from about 1% to about 10% of tungsten (or its equivalent molybdenum), or up to about 6% of copper, or both of these elements at one time.

Second—Alloys according to (1), characterized further by the fact that they contain from about 0.5 to about 2% of silicon and from about 6% to about 8% of nickel.

Third—Specific alloys according to (1) containing, in addition to iron, approximately:

a) 0.26% of carbon, 1.33% of silicon, 0.63% of manganese, 22.20% of chromium and 7.52% of nickel.

b) 0.13% of carbon, 0.53% of silicon, 2.56% of manganese, 20.10% of chromium and 7.54% of nickel.

c) 0.37% of carbon, 1.55% of silicon, 0.65% of manganese, 19.60% of chromium and 7.75% of nickel.

d) 0.51% of carbon, 1.81% of silicon, 0.42% of manganese, 20.80% of chromium, 6.82% of nickel and 3.93% of tungsten.

e) 0.26% of carbon, 1.31% of silicon, 0.39% of manganese, 21.30% of chromium, 7.28% of nickel, 4.76% of tungsten and 2.00% of copper.

Fourth:—An alloy according to (1) containing also slight percentages of one or more other elements such as cobalt, vanadium, titanium and aluminum.

R. A. HADFIELD

Translated by D. C. Harrison

61 FRENCH PATENT 666,789 Issued May 28, 1929

Commentry, Fourchambault et Decazeville, S. A. Filed March 30, 1928

Alloy Uniting Improved Mechanical Properties With A Great Resistance to the Action of Corrosive Agents.

The applicant company has studied for a long time alloys uniting good mechanical qualities with a great resistance to the action of acids and, in general, of corrosive agents used or handled in industry.

It has recognized the superiority, which is no longer disputed today, of metals of a homogeneous structure and devoid of abnormalities in the various physical properties.

It has studied in particular the chromium-containing ferronickels having gamma or austenitic iron, and has obtained a French patent number 496,928 of the 19th of December 1927 and a certificate of addition number 22,790 of February 26, 1920, relating to alloys containing certain contents of Ni and of Cr.

The result of these studies has shown that one can obtain a new series of alloys which are quite remarkable for their mechanical properties and their very great general resistance to corrosion by diminishing the content of Ni provided for in these first patents and by replacing this metal, in a smaller proportion, by some Mn, so as to preserve the austenitic structure, while profiting by the lower cost and the technical advantages of this latter element.

The applicant company contemplates also the advantage of increasing at the same time the Cr content which can, in certain cases, go to 30%.

The present invention relates to Fe-Cr-Ni-Mn alloys of this sort whose composition is comprised in the following limits:

C	1%
Cr	15 to 30%
Ni	2 to 12%
Mn	12 to 2%
Fe	the rest

the sum of the Ni and Mn contents necessary to obtain the structure aimed at being about 8% and having no need to go beyond 20%.

The resistance of these alloys to certain corrosives
62 can be improved by additions of Cu and Mo together
or separately, a content of 6% of each of these elements being, in general, sufficient; their non-oxidizability at a red heat, an equally interesting property, by an addition of Si, of which a content up to 3% will generally suffice. Their texture can be improved by an addition of one or more of the known purging agents:

A1—V—Ti—Zr added in the customary proportions. The Ni can be replaced toally or in part by Ca. (Ca is a misprint, see claim 3).

These alloys possess remarkable qualities of resistance to corrosion. Thus, a metal of the following composition:

C	Si	Mn	Ni	Cr	Fe
0.31	0.30	8.72	4.92	21.20	the rest

has given the following results (corrosion C evaluated in mg/sq. cm. for the total duration of the test).

HNO_3 + 1% HCl at 90° for about 15 days, C = 3.

CH_3COOH, 10% at 10% (misprint) for about 8 days, C = 0.1

HCOOH, 10% at 90° for about 12 days, C = 4

CH_3COOH, 50% at 90° for about 4 days, C = 0.1

HNO_3 + 5% HCl at 20° for about 5 days, C = 0.15

Glacial acetic at 90° for about 3 days, C = 0.7

Glacial acetic, boiling, for about 60 hours, C = 1.2

The attack by sea water and by nitric acid at all concentrations and temperatures is practically nothing; it can also be said that the resistance is practically perfect towards a great number of corrosive agents.

The mechanical characteristics are particularly interesting: on the alloy given in example hereinabove, it is found that the elongation to rupture is better than 40% for a resistance to tensioning of 75 to 89 kgm/sq.m (tensile bar 9.4 mm. diameter and 68 mm. length between marks). The resilience is raised.

These alloys are easily worked by rolling or forging, between 1150 and 850°, and may well constitute in this respect an appreciable progress over the ferrous alloys now proposed for their resistance to corrosion.

They can also be obtained as cast pieces and forg-
63 ings, bars and rolled sheets; wire-drawn filaments,
are easy to manufacture and can be welded either by
the blow-pipe flame or by the electric arc.

They are quite suitable for the fabrication of complicated apparatus having to resist shocks or high pressure, such as tubs, containers of all sorts, tubes, tube-coils, bucket-conveyors, baking utensils, pumps, etc. Their excellent resistance to salty water suits them particularly for all parts of submarines, hydroaeroplanes, ships, which are to be in contact with the sea, for the construction of submarine cables, etc.

Résumé

This invention comprises:

1. An alloy of iron-chromium-manganese and nickel, endowed with remarkable qualities of resistance to sea water, to acids and corrosive agents and of high mechanical properties and having the following composition:

Cr ....15 to 30%
Ni .... 2 to 12%
Mn ....12 to 2%
C 1%
Fe ....the rest

the sum of the contents of Ni and Mn being comprised between 8% and 20%.

2. The addition to the alloy specified in (1) of the following elements, either in combination or separately:

a) of copper and of molybdenum, together or separately, each of these elements having a content going for example up to 6%.
b) of silicon of which the content may go for example up to 3%.

c) of known purging agents, such as aluminum, vanadium, titanium, zirconium.

3. A variant of the alloy specified in 1 and 2, in which the nickel is totally or partially replaced by cobalt.

4. The application of the alloys specified hereinabove, to the manufacture of metallic articles of all kinds having to resist sea water, acids and corrosive agents, as well as said articles as new industrial products.

S.A.: Commentry, Fourchambault et Decazeville

Translated by D. C. Harrison No. 11
K. PO: L

---

64 United States Patent Office

BEFORE THE BOARD OF APPEALS

In re application Frederick M. Becket, Serial No. 503,528, Filed Dec. 18, 1930, Stain Resisting Alloys.

Examiner's Statement

This is an appeal from the examiner's final rejection of claims 9 and 10. Newly present claim 11 has been entered for the purposes of appeal.

9. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of chromium; about .25% to about 2.75% of copper; carbon, the carbon content being not more than about 0.3%; at least about 3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 6% and about 14%; the balance of the alloy being substantially iron.

10. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of chromium; about .25% to about 2.5% of copper; carbon, the carbon content being not more than about .12%; at least about 3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 8% and about 14%; the balance of the alloy being substantially iron.

11. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of chromium; about .25% to about 2.5% copper; carbon, the carbon content being not more than about .12%; at

least about 5.3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 8% and about 14%; the balance of the alloy being substantially iron.

References.

(Fr.) Comentry, 666,789 May 28, 1929
" Hadfield, 590,691 Mar. 23, 1925
(Br) " 313,471 June 10, 1929
" Greaves, 117,286 July 8, 1918

Description of Invention.

This invention relates to alloys containing chromium (Cr), manganese (Mn), nickel (Ni), copper (Cu), carbon (C) and the balance of the alloy being substantially iron.

It is stated this alloy is stain resistant and has the
65 property of being drawn.

(Note: The specification discloses two alloys, namely Fe-Cr-Mn-Cu and Fe-Cr-Mn-Cu-*Ni*, the latter being the only one now claimed. The most of the description of the alloy now claimed occurs page 5, last paragraph et seq.)

Description of the References.

French666,789 to Commentry: This reference, (page 1, lines 31-45) or (page 2, lines 67-75) discloses an alloy containing 15-30% Cr, 2-12% Ni, 12-2% Mn, less than 1% C, iron the rest and indicates that the combined Ni and Mn should be between 8 and 20%.. Page 2, lines 77-80, state that Cu or Mo together or *separately* may be present *up to* 6%. That is, that 6% is merely the maximum and values below 6% are clearly contemplated and covered by Commentry. Commentry page 2, lines 5-10 further shows an example with 0.31%C, 0.30% Si, 8.72% Mn, 4.92% Ni, 21.20% Cr and Fe substantially the rest. Please note that Commentry, in disclosing his C content has expressly used the symbol "less than" 1% and in the example given .31% is stated which is much less than 1%. Commentry, page 2, lines 45 and 52 distinctly states his alloy may be formed into *drawn wires*, tubes, etc,

Hadfield, (British) page 1, lines 20-30, or page 2, lines 6-20 discloses an alloy with .05-1% C, 2-22% Ni, 10-30% Cr, .25-4% Mn, .2 to 5% Cu and the balance iron with 1-10% W or Mo, and .05 to 4% Si. Page 1, lines 33-43 or page 2, lines 23-35 show the alloy to be resistant to heat and corrosion.

Hadfield, (French) Page 1, lines 22-31, or page 2, lines 80-90 shows an alloy that may have less than 1% C, up to 8% Mn, 5-25% Cr, 2-20% Ni, 1-10% Si, 1-10% W or Mo, up to 6% Cu, and the balance iron. Page 2, lines 70, et seq shows the alloy to be resistant to heat, corrosion, etc.

66 (British) Greaves shows that Mn may be substituted in stainless steels containing Cr, Ni, etc.

Grounds of Rejection.

For the purposes of convenience, the following data is tabulated below:

	Cr	Cu	C	Mn	Ni	(Ni Mn)	Fe	Other Elements
Claim 9	16.22	.25-2-75	not more than about .3	3-	2-	6-14	substantially balance	....
Claim 10	16-22	.25-2.5	— .12	3-	2-	8-14	"	....
Claim 11	16-22	.25-2.5	— .12	5.3	2	8-14	"	....
666,789 (Fr.)	15-30	up to 6	less than 1	12-2	2-12	8-20	"	....
	21-2	0-6	.31	8.72	4-92	13.64	"	(.3Si)
313,471 (Br.)	10-30	.2-5	.05-1	.25-4	2-22	not stated	"	(Mo or W Si)
590,691 (Fr.)	5-25	up to 6%	up to 1	up to 8	5-20	not stated	"	Mo or W Si

Rejection on Commentry:

All the claims including claim 11, which was added for the purpose of appeal, are considered unpatentable over Commentry (French) for the following reasons: It can be seen by inspection that Commentry's Cr, Mn and Ni contents clearly meet applicant's hence it is believed unnecessary to make further remarks concerning these elements.

Applicant appears to attempt to differentiate from Commentry in the C and Cu contents. Considering first the C content of claim 9. Claim 9 states not more than *about* .3%. Commentry discloses that his C is to be *less than* 1% and gives a specific example of .31%. It is believed that applicant's *about* 0.3% is clearly broad enough to be met by this reference.

67 Furthermore, no valid reason is seen in applicant's arguments to the effect that Commentry should be limited to exactly .31%, merely because Commentry shows an example with .31% C. It is believed that some latitude should be allowed in the interpretation of this French patent. Particularly in view of the fact that Commentry mentions *drawn* wires (page 2, line 45). Also when Commentry stated *less than* 1% C and gave an example of .31% C, it is clear Commentry contemplated C much lower than 1%. (Please note also that applicant indicates: (page 7, lines 15, 16, 17, page 4, lines 20, 21) "where maximum workability is not required, *the carbon may rise to at least 1%*" (italics are the examiner's). Hence applicant may have higher C. In claims 10 and 11, applicant relies on the not more than *about* .12% C content to differentiate from Commentry. While this C content is slightly lower than that of claim 9, it is believed that it is still met by Commentry.

Patentable distinction *cannot* be raised on the small Si content (.31%) mentioned by Commentry because applicant's claims merely state balance *substantially* iron. Furthermore, Si is a usual impurity. (Note: That Si is a usual impurity may be seen by reference to any handbook on Steel, as for example, "The Making, Shaping, Treating of Steel, 4th Ed., 1925 page 758).

Considering now the Cu content of claim 9. Applicant claims .25 to 2.75%. Please note, however, that applicant's original specification, page 7, lines 13 and 14 states: "When hot-working is not contemplated, the *copper may rise to 5%.*" (Italics are the examiner's.) Commentry discloses Cu "jusqu'a 6%", which it is believed means as far as, or up to 6% and clearly meets applicant's Cu range.

68 For example, French 590,691, page 1, line 30, uses the expression "jusque 6%" as applied to its Cu percentage and than on page 2, line 52 gives an example with a Cu content of 2.07%. This shows that the proper interpretation of Commentry's expression contemplates values of Cu below 6%. (Note: French-English Dictionary for Chemists, by Patterson 1921 page 201, shows that "jusque" and "jusqu'a" are substantially the same.) For similar reasons, the Cu contents of claims 10 and 11 are considered as met.

Rejection on Hadfield (Brit.)

By inspection, it can be seen that the Cr and Ni contents of this reference clearly meet the claims. Hadfield's .05% C clearly meets applicant's. Also Hadfield's Cu meets applicant's.

Applicant attempts to differentiate over Hadfield in that Hadfield contains W or Mo, and in Hadfield's Mn content. While it is true Hadfield alloys contain W or Mo which, however, may be only 1%, this is believed an immaterial difference. Applicant's claims merely state "balance of the alloy being substantially iron". Applicant's claims do not exclude a W or Mo content. It is believed that the balance of Hadfield's alloy meets the term balance *substantially* iron.

Hadfield's Mn content, which *may be 4%*, meets claims 9 and 10. In newly presented claim 11, the Mn has been limited to 5.3% which is slightly outside of Hadfield's. It is thought that this difference is merely a technical, numerical avoidance of the reference, in view of applicant's other claims, and disclosure showing that the Mn may be as low as about 3%.

Rejection on Hadfield (French).

Hadfield, (French) discloses Cr-Ni-Cu-C contents considered as meeting applicant's. As indicated above, the fact that Hadfield's alloy may contain 1% W or Mo and Si is believed immaterial, in view that applicant's claims merely state balance *substantially* iron.

69 This Hadfield patent, page 1, line 24, or page 2, line 82 shows that the Mn content may be up to 8%. Hence, the French patent shows Mn considered as meeting claim 11, as well as 9 and 10, particularly in view of British 117,286, which suggests the feature of using Mn in steels containing Cr, Ni, etc. This British patent also shows the feature of using low carbon less than .4% where *ductility* (i. e. ability to be drawn) is desired.

Affidavits.

In order to eliminate the Hadfield references, which, as indicated above, include W or Mo, applicant has presented showings as to the effect of W or Mo. Applicant's tests are alleged to show that the W or Mo increase hardness, etc.

On page 3 of the affidavits applicant states: "the alloys described by Hadfield of references do not develop deep drawing characteristics *to the same degree* as applicant's". (Italics are the examiner's.) Please note that applicant does not suggest that Hadfield's alloy may not be deep drawn, but merely appears to allege a difference of degree only.

Even assuming that applicant might show that W or Mo exerted a detrimental effect, as indicated above, applicant's claims merely state balance *substantially* iron, hence they are believed broad enough to be met by the Hadfield references.

Please note that there appears to be no showing in the affidavit against the reference Commentry 666,789, which has been fully applied at the beginning of the Examiner's Statement.

It is believed that the rejection of claims 9, 10 and 11 was proper and should be sustained.

Respectfully,

A. LINDSEY,
Div. 3. *Examiner.*

Hup

70 Div. 3 : Rm. 4093 Ch:G 29.

Mailed Feb 9 1935

United States Patent Office

Before the Board of Appeals.

In re application of Frederick M. Becket,

Serial No. 503,328

Filed Dec. 18, 1930.

For: Stain Resisting Alloys.

Examiner's Statement

This is an appeal from the action of the Examiner in finally rejecting claim 12. The remaining claims in this case, 9, 10 and 11 were rejected by the examiner, that rejection was affirmed by the Board of Appeals, and they are now before the courts under R.S. 4915.

The claim under consideration reads as follows:

12. A ferrous alloy characterized by its resistance to acid corrosion or intergranular corrosion, by its machineability and foreability and its stable, nonmagnetic condition comprising chromium about 18%, nickel about 8%, copper about 1.5% to 3%, manganese about 4% to 6%, carbon not substantially above about 0.15% and silicon less than 1%, the balance being substantially all iron.

The invention, involved, relates to alloy steels containing in addition to the usual impurities, chromium, nickel, copper and manganese.

The claim in question, was copied from a patent to Armstrong 1,962,702 and its patentability over the prior art is not questioned by the examiner.

Claim 12 has been rejected as unpatentable to applicant in this application on the basis that it involves new matter and is unwarranted by the original disclosure.

Applicant's original specification stated the invention broadly as residing in alloys "containing, as essential constituents, the metals iron, chromium, manganese, and
71 copper". (page 2, lines 1 to 3).

These alloys contained chromium in the range of 16-22% and manganese in the range of 5-15%. The addition of copper .25-2.5% is said to increase the deep drawing properties of the metal. On page 3, last paragraph to the top of page 4, the copper is stated as varying inversely with the manganese.

Page 5, last paragraph specifies that nickel additions in amounts more than 2% still further improve the workability. Nickel varies inversely with manganese but there must be at least 3% Mn present. The claims, as 9, 10, and 11, covered alloys of the following composition:

Cr	16-22%
Cu	.25-2.75%
Mn	more than 3%
Mn+Ni	6-14%

The claim here under consideration covers the following alloys

Cr	18%
Cu	1.5-3%
Mn	4-6%
Ni	8%

It can be readily seen that the composition of the claim here under consideration falls within the broad ranges of applicant's disclosure and claims.

It is well settled, however, that the discovery of narrower limits of ingredients which produce an alloy having new and unobvious properties entitles the discoverer to patent protection as an improvement on the basic or broader composition. Here the broad composition has been held unpatentable by the Patent Office, and the question is whether or not one is entitled to claim the improvement after disclosing simply the broader or basic composition.

In this particular case, Armstrong discovered that austenitic (non-magnetic) chrome-nickel steels, of which the 18% Cr-8% Ni is typical, could be made more resistant to intergranular corrosion by the addition of copper
72 and manganese thereto in certain specified proportions, viz., manganese more than copper but never more than four times the copper. In claim 12 this ratio is inherent in the ranges of copper 1.5-3% and manganese 4-6%. It is to be noted that this phenomenon of intergranular corrosion occurs only in the austenitic alloys.

Applicant does not characterize his alloy as austenitic in his disclosure. It has been argued that they would be austenitic as a matter of fact and in this respect, it is admitted by the examiner that manganese has a similar effect to nickel in changing the magnetic iron to the non-magnetic form; also a large number of alloys covered by the disclosure would probably be austenitic but it is considered that non-austenitic alloys are also included in applicant's range such as 16% Cr-5% Mn plus Ni, with 1 or 2% of Cu.

Applicant did not include nickel as an essential element, supra, but as a modifying element producing improved workability. Armstrong does not cover nickel anywhere near as low as 2%.

Claim 12 covers the austenitic 18-8 (Cr-Ni) alloy with manganese always more than the copper but *never more than four (4) times the copper.* This is said to be for the purpose of improving the resistance to intergranular corrosion. Applicant gives no specific example in his application of an austenitic chrome-*nickel* steel of the 18-8 type. The closest to this are examples 3 and 6 on page 6, but in every one of the examples the manganese is higher than the nickel; in other words, it is a chrome-manganese alloy modified by nickel instead of a chrome-nickel alloy modified by manganese.

There is no example in applicant's specification in which the manganese is less than four (4) times the copper. Examples 3 and 5 are the closest here and are 4.5 and 4.4 times the copper, respectively.

The situation as a whole then is as follows:

73 Applicant discloses ranges covering claim 12 but does not recognize the value or the new result obtained by the narrower limits of this claim, nor does he give any specific examples coming within the terms of the claim.

For these reasons, it is believed that claim 12 was properly rejected as unwarranted by the original disclosure and it is respectfully submitted that this rejection should be affirmed.

Respectfully,

A. LINDSEY,
NPC. *Examiner*, Div. 3.

74 Appeal No. 8628 Paper No. 18

Decision.

U. S. Patent Office

Board of Appeals

Mailed Aug 12 1933

Appeal No. 8628 TM

Hearing: June 28, 1933

In the United States Patent Office

Before the Board of Appeals

Ex parte Frederick M. Becket

* * *

Application for Patent filed December 18, 1930, Serial No. 503,328. Stain Resisting Alloys.

Messrs. Potter, Pierce & Scheffler for applicant.

This is an appeal from the final rejection of claims 9, 10 and 11—all of the claims in the application. The claims are as follows:—

9. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of chromium; about 0.25% to about 2.75% of copper; carbon, the carbon content being not more than about 0.3%; at least about 3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 6% and about 14%; the balance of the alloy being substantially iron.

10. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of chromium; about 0.25% to about 2.50% of copper; carbon, the carbon content being not more than about 0.12%; at least about 3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 8% and about 14%; the balance of the alloy being substantially iron.

11. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of chromium; about 0.25% to about 2.50% of copper; carbon, the carbon content being not more than about 0.12%; at least about 5.3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 8% and about 14%; the balance of the alloy being substantially iron.

The references relied on by the Examiner are:—

Greaves et al. (Br.)	117,286	of	1918
Hadfield (Fr.)	590,691	of	1925
Hadfield (Br.)	313,471	of	1929
Commentry (Fr.)	666,789	of	1929

The appealed claims relate to stain-resisting alloys which at the same time have deep-drawing properties. The alloy comprises essentially chromium, copper, carbon, manganese, nickel and the remainder iron, except for the usual undesired and practically unavoidable impurities. This would allow the usual proportion of sulphur, phosphorus and silicon generally found in steel. Applicant allows a latitude up to 0.5% silicon—Exhibits F and G. The original disclosure treated nickel as an optional constituent but each of the claims here on appeal definitely include at least 2% of nickel.

The chromium in applicant's alloy may vary within the range of from 16% to 22%; the copper from 0.25% to 2.75%; the carbon from 0.08% to 0.3%; the manganese from 3.0% to 5.3% and the nickel not less than 2%. A further requirement is that the sum of the manganese and nickel percentages must fall between a minimum of about 6% and a maximum of about 14%.

76 The Examiner has set forth a table of percentages for comparison on page 3 of his statment, as between the three claims and the three references relied upon, which in convenient form shows the contents and relative percentages.

It appears obvious that the range of percentages set forth in each of the three claims falls within the broader range of percentages of the corresponding elements in the references, Commentry and the French patent to Hadfield. The British patent to Hadfield does not contemplate omission of Tungsten or Molybdenum. The question is presented here whether invention can be considered involved in thus selecting a restricted area within a larger field.

We believe the rule is clear that this is not possible where no unobvious or new result of a very striking and distinctive nature such as would be considered to amount to a discovery of a new property or mode of action in the alloy under certain conditions. Applicant has attempted in this record to point out that such marked new properties are true of the range of alloys set forth in his claims and that the claims should be allowed although as we consider directly readable upon the disclosure of Commentry and the French patent to Hadfield. Applicant particularly has made extensive showing in the record in the form of affidavits concerning tests whereby he thinks it is established that the references do not produce an alloy as effective in resisting corrosion and in possessing deep-drawing properties.

77 We have carefully considered the showing but are unable to find that any such striking or unobvious results are produced as to amount to more than possible expected differences within reasonable range of latitude. The matter of ability to resist corrosion is a very indefinite feature to compare. The Commentry patent, No. 666,789 alleges that one of the purposes of that alloy is to have a great resistance to action of acids and other corro-

sive agents. It is further stated that the alloy has good ductile properties for drawing wire and also apparently for tubes and pipes which would presumably be made by drawing in view of the language used. This indicates that that alloy would possess to considerable degree the deep-drawing properties claimed by applicant. Applicant alleges that the Commentry disclosure is only a broad guess or speculation in respect to the properties alleged but we see no reason to warrant this allegation particularly in view of the indefinite matters concerned where we have no exact figures upon resistance to corrosion and no reason to doubt the alleged good drawing and forging properties of certain ranges of the alloys disclosed in the patent. The same conclusions are believed to apply to the French patent to Hadfield.

While applicant has shown by some exhibits and the tests accompanying the affidavits that the maximum or higher ranges of chromium or copper or manganese or nickel within the range of the references produce alloys which are hot short and crack if forged and do not have good drawing properties, we think this is not proof of patentability of applicant's product. It is considered well known 78 that alloys too high in manganese and chromium would generally tend to become non-forgable and that if forging and drawing is a desired consideration that a skilled metallurgist would keep within the lower ranges of these constituents.

While we appreciate the amount of research that may be involved in testing out specific variations in proportions of this group of alloying constituents, we are convinced that the record presented here is not sufficient to overcome the presumption of the rule of non-patentability in this situation such as announced In re Lothrop 422 C. D. 609.

The decision of the Examiner is affirmed.

J. M. HOPKINS,
Assistant Commissioner,
W. L. REDROW,
Examiner-in-Chief,
F. P. EDINBURG,
Examiner-in-Chief,
Board of Appeals.

August 12, 1933

79 Appeal No. 13756 Paper No. 33

Decision.

U. S. Patent Office

Board of Appeals

Mailed Jun 7 1935

Appeal No. 13,756 VFM

In the United States Patent Office

Before the Board of Appeals

Ex parte Federick M. Beckert

Application for Patent filed December 18, 1930, Serial No. 503,328. Stain Resisting Alloys.

Messrs. Potter, Pierce & Scheffler for applicant.

This is an appeal from the final rejection of claim 12 which reads as follows:

12. A ferrous alloy characterized by its resistance to acid corrosion or intergranular corrosion, by its machineability and foreability and its stable non-magnetic condition comprising chromium about 18%, nickel about 8%, copper about 1.5% to 3%, manganese about 4% to 6%, carbon not substantially above about 0.15% and silicon less than 1%, the balance being substantially all iron.

This application is at present involved in suit in equity under R. S. 4915 concerning the patentability of claims 9, 10 and 11 as to which this Board affirmed the rejection of unpatentability over the state of the art as applied by the examiner. Present claim 12 has been copied from the patent to Armstrong 1,962,702. The examiner rejects this claim on the ground that it is unpatentable to applicant in this application for the reason that it involves new matter
and is unwarranted by the original disclosure. It
80 appears that the situation is one in which the par-
ticular proportion named in claim 12 comes within
applicant's original disclosure but yet not pointed out as specifically being important in such particular combination required by this claim. It is considered established that particular association of elements in particular proportions in an alloy may be allowable over a broader disclosure in

the are where some new and unobvious result is secured and proven. Such appears to be the case as to the allowability of the particular claim 7 of the Armstrong patent which applicant attempts to secure. The examiner points out that these proportions are quite limited and that certain specified results are claimed by Armstrong to be secured thereby, namely, among others, that of being austenitic. It is our opinion that in this situation as pointed out by the examiner that applicant is not entitled to make a claim to the very particular limitations and proportions which are not set forth in his specification as being found by applicant to be material or having any outstanding properties.

The decision of the examiner is affirmed.

W. L. REDROW
Examiner-in-Chief,

B. PIERCE
Examiner-in-Chief,

F. P. EDINBURG
Examiner-in-Chief,

June 7, 1935

Board of Appeals

Endorsed on Cover: District Court of the United States for the District of Columbia. No. 6790. Frederick M. BECKET, Appellant, vs. Conway P. Coe, Commissioner of Patents. United States Court of Appeals for the District of Columbia. Filed Jul 20, 1936. Moncure Burke, Clerk.

FOR MR. JUSTICE ROBB

UNITED STATES
COURT OF APPEALS FOR TH
DISTRICT OF COLUMBIA
FILED NOV 20 1936
CLERK

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA.

April Term, 1936.
Docket No. 6790.

FREDERICK M. BECKET,
Appellant,

vs.

CONWAY P. COE, Commissioner of Patents,
Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

BRIEF FOR APPELLANT.

RICHARD L. SCHEFFLER,
Attorney for Appellant.

Of Counsel for Appellant:

RALPH E. PARKER,
EUGENE L. GREENEWALD,
WARREN J. WILLIS.

INDEX.

PAGE

Concise Statement of the Case 1
Description of the Invention 3
Errors Assigned 5
Points of Law and Fact to be Discussed 6
The References 8
  Hadfield French Patent 590,961 10
  Commentry French Patent 666,789 11
  The British Patents 12
References are Merely Speculative 13
Plaintiff Secures a New and Unobvious Result 15
Becket and Armstrong Claim Same Invention 16
How the Errors Arose 19
Summary and Conclusions 20

Table of Cases Cited.

CITED ON PAGES

Am. Stainless Steel Co. v. Ludlum St. Co., 290 Fed. 103 .... 7, 20, 21
Bethlehem Steel Co. v. Churchward, 268 Fed. 361 .. 7, 19, 20
Carnegie v. Cambria, 185 U. S. 403 21
Catalin Corp. of America v. Catalazuli, 79 F. (2d) 593 .... 20, 21
Champney, *Ex parte*, 1892 C. D. 176 21
Crampton *et al.*, *Ex parte*, 21 U. S. Pat. Q. 644 .... 7, 20
Cross, *In re*, 62 F. (2d) 182 9
Darwin & Milner v. Kinite, 72 F. (2d) 437 ..... 7, 8, 19, 20
Dreyfus, *In re*, 22 C. C. P. A. 830 .... 7, 8, 19
Eibel Co. v. Paper Co., 261 U. S. 45 21

PAGE
General Electric Co. v. Hoskins, 224 Fed. 464....7, 9, 14, 21
Haynes Stellite Co. v. Chesterfield, 22 F. (2d) 635..7, 9, 20
Lilienfeld, *In re,* 21 C. C. P. A. 792.................... 7
Loom Co. v. Higgins, 105 U. S. 580.................... 21
Lothrop, *In re,* 19 C. C. P. A. 1183....................7, 19
Ludlum Steel Co. v. Terry, 37 F. (2d) 153............ 21
Miller, *Ex parte,* 22 U. S. Pat. Q. 336...............7, 21
Picard, *Ex parte,* 11 U. S. Pat. Q. 64................ 21
Pilling, *In re,* 18 C. C. P. A. 703....................7, 19
Pittsburgh Iron & Steel Co. v. Seaman-Sleeth, 268 Fed. 361 20
Richter, *In re,* 19 C. C. P. A. 756.................... 7
Root Refining Co. v. Universal Oil Co., 78 F. (2d) 991.. 22
Skelly Oil Co. v. Universal Oil Co., 31 F. (2d) 427.... 22
Topliff v. Topliff *et al.,* 145 U. S. 156................ 21
Wells, *In re,* 19 C. C. P. A. 1044....................7, 19
Wemple *et al.* v. Peirce *et al.,* 21 U. S. Pat. Q. 644....8, 18
Westinghouse v. Great Northern, 88 Fed. 258...7, 9, 14, 21

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA.

FREDERICK M. BECKET,
Appellant,
v.
CONWAY P. COE, Commissioner of Patents,
Appellee.

April Term, 1936
No. 6790

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA.

In Equity No. 56,792

BRIEF FOR FREDERICK M. BECKET.

Concise Statement of the Case.

This is an appeal from a decision of the United States District Court for the District of Columbia dismissing a Bill of Complaint and a Supplemental Bill of Complaint brought by Frederick M. Becket against Conway P. Coe in the latter's official capacity as Commissioner of Patents of the United States. Both the Bill of Complaint and the Supplemental Bill of Complaint were duly filed under the provisions of the Revised Statutes, Section 4915.

The Bill of Complaint and the Supplemental Bill of Complaint are concerned with a single application for Letters Patent Serial Number 503,328 filed on December 18, 1930, by the plaintiff (appellant) for improvements in "Stain Resisting Alloys" invented by the plaintiff, Frederick M. Beckett. The original Bill relates specifically to claims 9, 10, and 11 of that application, and the Supplemental Bill relates to claim 12 copied into that application from U. S. patent No. 1,962,702 issued to one Percy A. E. Armstrong on June 12, 1934.

The invention involved is a new kind of stainless steel having new and valuable properties and uses. These new properties are attained by a novel combination of the elements chromium, manganese, nickel, copper, carbon, and iron in certain specific and critical proportions defined in the plaintiff's specification and claims, to wit: 16% to 22% chromium, at least 3% manganese, at least 2% nickel, 0.25% to 2.75% copper, and not over 0.3% carbon, the sum of the manganese and nickel being between 6% and 14%.

What the plaintiff respectfully contends is that the defendant, the Honorable Commissioner of Patents, wrongfully continues to withhold a patent to the plaintiff on the invention defined by the above-mentioned claims 9, 10, 11 and 12.

The plaintiff does not claim to be the first to propose to combine the elements in question to form a steel. What he does claim is that he is the first to discover and to disclose a new recipe or formula for the relative proportioning of these ingredients, whereby a new form of matter, having new characteristics of great value, is attained. He further asserts that his disclosure has effected a real and substantial advance in the art, and that, without the information disclosed by him, nobody could have made the new material. Under these circumstances, it is submitted, the defendant has wrongfully withheld a patent from the plaintiff.

The plaintiff further asserts that the same invention as that involved here, in essential respects, was disclosed and claimed in an application, filed three years after plaintiff's application, by one Percy A. E. Armstrong. On this Armstrong application, a patent, No. 1,962,702 was issued on June 12, 1934. Although the plaintiff Becket copied a claim from this patent and also presented a claim coextensive in scope with the overlapping subject-matter of his application and the patent, the defendant refused to allow either claim to him. It is respectfully urged that the defendant wrongfully refused to allow such a claim to the plaintiff.

It is contended by the defendant, the Honorable Commissioner of Patents, that the plaintiff's claims embrace proportions of ingredients falling within ranges of composition shown in two earlier French patents, that the plaintiff has not discovered any unexpected properties characteristic only of his proportions, that Armstrong did disclose unexpected properties for the proportions found by him, and that under these circumstances Armstrong is entitled to a patent but the plaintiff is not. All of this the plaintiff emphatically denies, and the testimony taken for the plaintiff before the Honorable District Court conclusively proves, it is submitted, that the new properties disclosed by the plaintiff are unexpected and characteristic only of his proportions, and that the properties and proportions disclosed by Armstrong are identical in all substantial and significant respects with those disclosed by the plaintiff.

No testimony was taken on behalf of the defendant, and the defense rested on the prior art and reasons relied upon by the Patent Office Board of Appeals in sustaining the Examiner's rejection of plaintiff's claims. The Honorable Court below dismissed the plaintiff's Bill, without indicating in what respect, if any, Armstrong's patented invention differs from the plaintiff's invention. This decision, it is submitted, is directly contrary to a great weight of completely credible and unimpeached evidence.

Description of the Invention.

(Page Numbers Refer to the Printed Transcript of Record)

The invention described and claimed by the plaintiff is a new and useful kind of stainless steel having an unusual combination of physical and chemical characteristics, attained by a peculiar combination of materials in certain critical proportions.

The unusual combination of properties includes, notably, stain resistance and the ability of the steel to be deep drawn.

Stain-resistance is a rare kind of corrosion-resistance, and denotes a resistance to tarnishing or surface discoloration in corrosive media. A fairly large number of metals and alloys, such as nickel, pewter, silver, copper, brass, aluminum, and lead offer considerable resistance to corrosion in that, under ordinary weathering or the action of the commoner corrosive agents such as foodstuffs, they will resist destruction for a fairly long time; but all such common metals readily tarnish and must be polished frequently if a bright and clean surface is to be maintained (p. 21, lines 16 to 23). Except for certain expensive metals such as gold and platinum, the known stain-resistant metals are few in number and consist usually of chromium or its alloys, for instance: stainless steel. The addition of enough chromium to steel to impart stain-resistance, however, destroys the deep-drawing qualities of the steel, unless an expensive heat-treating operation is employed. Even when a special heat treatment is used, the deep-drawing properties of an ordinary stainless chromium steel are far from being entirely satisfactory.

"Deep-drawing" is a term used to designate any operation in which cold metal is rapidly and severely deformed. Familiar examples of articles ordinarily made by deep-drawing include automobile hub-caps, radiator shells, horns, and headlights, as well as many other seamless hollow shapes. Deep-drawing is sharply contrasted to hot-working or casting because all metals and alloys may be shaped by one or the other of these high-temperature operations, whereas to withstand deep-drawing the material must have unusually great ductility, strength and toughness when cold, so that the cold deforming operation will neither rupture the metal nor set up strains inside the metal that will subsequently cause rupture during use of the drawn article (p. 21, fourth paragraph).

There are many common metals and alloys that can be deep-drawn, notably copper and brass, nickel, aluminum, silver, pewter, and lead; but such materials are not stain-resistant, as was explained above. Among the ferrous metals, plain iron and steel, without added alloying metals, may be deep-drawn, but are not stain-resistant. Most things that can be added to steel to increase its stain-resistance destroy its ability to be deep-drawn.

The situation is, therefore, that stain-resistance is fairly easily attained, and deep-drawing ability is easily attained; but it is extremely difficult to attain both properties in the same material, and if the material is to be an iron alloy, or steel, the difficulty of attaining both properties is very great indeed; so much so that, prior to the present invention, only *one* steel answering this description was known, the so-called "18-8" chromium-nickel steel containing about 16% to 20% chromium and about 6% to 10% nickel (p. 21, lines 30 to 35).

According to the present invention, this rare combination of stain-resistance and deep-drawing ability is attained in an alloy steel containing, as the essential ingredients, iron, chromium, manganese, nickel, copper, and carbon in novel proportions: 16% to 22% chromium, at least 3% manganese, at least 2% nickel, 0.25% to 2.75% copper, up to 0.3% carbon, remainder iron, the sum of the nickel and manganese percentages being between 6% and 14% (Claim 9, R., p. 61). These proportions are not only novel: they are critical, in the sense that substantial departure from these proportions will result in failure to secure the desired properties (p. 21, line 35, to p. 23, line 17; and p. 25, lines 6 to 31). Moreover the fact that the novel proportions would produce the desired properties was unpredictable and unobvious (p. 25, last paragraph, to p. 27, line 11).

Errors Assigned.

The plaintiff contends that the Honorable District Court below erred in dismissing the Bill of Complaint herein and failing to enter a decree adjudging that the plaintiff is entitled, according to law, to receive Letters Patent on his application Serial No. 503,328 filed December 18, 1930, as specified in the claims 9, 10, 11, and 12 recited in said Bill. On this error are based grounds I, II, and VII on pages 16 and 17 of the Record.

The plaintiff further contends that the Honorable District Court erred in holding that the subject-matter of the claims 9, 10, 11, and 12 of the aforesaid application Serial No. 503,328 is unpatentable to the plaintiff herein over the prior French patent to Hadfield 590,691, and the prior French patent to Commentry 666,789, adduced by the defendant, Ground III, page 16 of the Record, is based thereon.

The plaintiff also insists that the Honorable Court below erred in holding that the plaintiff's aforesaid application, Serial No. 503,328, does not point out in what respect the ranges of percentages of the various ingredients of the alloy are critical, or that striking or unobvious results are obtained within these ranges. On this error is based ground IV on page 16 of the Record.

The plaintiff further contends that the Honorable District Court erred in holding that the plaintiff herein did not point out in his application or otherwise show and prove any new and unobvious result, or any critical nature, in the percentages of ingredients specified in claim 12 (which is claim 6 of Armstrong U. S. patent 1,962,702), or give any example in his application of an alloy having the percentages specified in said claim 6 of the Armstrong patent, and that the plaintiff herein is not entitled to make in his application said claim 6 of Armstrong patent 1,962,702. On this error are based grounds V and VI on pages 16 and 17 of the Record.

Points of Law and Fact To Be Discussed.

It is the position of the defendant, as expressed in the decision of the Patent Office Board of Appeals, that the range of percentages of the ingredients of the alloy defined in plaintiff's claims falls within the broader range of the corresponding elements in the French patents to Commentry and Hadfield (p. 62, lines 12 to 17). This the plaintiff denies, because the portions of the references relied upon to anticipate the claims are merely speculative, gratuitous, and an inflated extension of the specific invention illustrated by the specific examples, and therefore cannot be considered a fair teaching even of the "broad range of percentages" referred to by the Board of Appeals. Plaintiff's position in this respect is well supported by precedent, for instance by the following cases: *Westinghouse* v. *Great Northern Co.,* 88 Fed. 258, at 263; *General Electric Co.* v. *Hoskins Mfg. Co.,* 224 Fed. 464, at 468; *American Stainless Steel Co.* v. *Ludlum Steel Co.,* 290 Fed. 103, at 106; *Haynes Stellite Co.* v. *Chesterfield,* 22 F. (2d) 635, at 638; *Ex parte Miller,* 22 U. S. Pat. Q. 336.

The defendant further asserts that an alloy claim specifying a narrow range of proportions, falling within a previously disclosed broad range of proportions, may be patentable if some new and unobvious result is thereby secured and is proven, but that the claim is not patentable in the absence of proof of such new and unobvious result (page 62, lines 17 to 24; and page 64, last 3 lines, to page 65, first 2 lines). The plaintiff insists that this rule is subject to the further limitation that the said new and narrow range of proportions must be critical, that is, a substantial departure from the new proportions shall result in failure to secure the new results. (*Bethlehem Steel Co.* v. *Churchward Iron and Steel Co.,* 268 Fed. 361, at 364; *Darwin & Milner* v. *Kinite Corporation,* 72 F. (2d) 437, at 438; *In re Norman B. Pilling,* 18 C. C. P. A. 703; *In re Richter,* 19 C. C. P. A. 756; *In re Wells,* 19 C. C. P. A. 1044; *In re Lothrop,* 19 C. C. P. A. 1183; *In re Lilienfeld,* 21 C. C. P. A. 792; *In re Dreyfus,* 22 C. C. P. A. 830; *Ex parte Crampton et al.,* 21 U. S. Pat. Q. 644, at 645.)

The defendant alleges that the plaintiff has failed to disclose and prove any new and unobvious result to be obtained by the use of the claimed new proportions (page 62, last paragraph). The plaintiff respectfully contends, on the basis of uncontroverted evidence, that the combination of properties of stain-resistance and deep-drawing ability, disclosed and proved by him to be characteristic only of the critical proportions claimed, is a new and unobvious result (pages 21, 22, 23, 25, 26, 27, 33, and 34).

The defendant also alleges that P. A. E. Armstrong discloses unexpected properties peculiar to the proportions found, disclosed, and claimed by him, which properties and proportions the plaintiff has failed to disclose (page 20, lines 26 to 29; page 65, lines 2 to 7). Just what properties are supposed to be the unexpected ones, the defendant has never attempted to explain: he has rested on the bare assertion that there are such properties. The plaintiff respectfully contends, and has established by convincing testimony, that the only "unexpected" properties disclosed by Armstrong are those which are also disclosed by the plaintiff, and that these properties are peculiar to plaintiff's entire range rather than to the narrow range specified in the single claim copied from the Armstrong patent (page 23, line 23, to page 25, line 5; and page 27, lines 12 to 32). Plaintiff insists that the Patent Office has become confused by differences in verbiage in the patent and application, has ignored their essential similarity, and further insists that the alleged difference between the Armstrong invention and plaintiff's invention is not a critical difference, either as to proportions or as to properties. Therefore, although both the Armstrong claims and the plaintiff's claims are patentable over the art, there is no patentable distinction between Armstrong's and the plaintiff's inventions. (*In re Dreyfus*, 22 C. C. P. A. 830; *Darwin & Milner* v. *Kinite Corporation*, 72 F. (2d) 437, at 438; *Wemple et al.* v. *Pierce et al.*, 22 C. C. P. A. 1064.)

The References.

The defendant cited in his answer to the Bill of Complaint the following prior patents, and he alleged that the plaintiff's claims 9, 10, and 11 are not patentable over these references:

Greaves *et al.*,	British, 117,286 of 1918
Hadfield	French, 590,691 of 1925
Hadfield	British, 313,471 of 1929
Commentry	French, 666,789 of 1929

Copies of the two British patents and stipulated translations of the two French patents appear on pages 41 to 52 of the printed Transcript of Record.

The first thing about these references which attracts attention is the fact that they are all either British or French patents. Not one was issued by the U. S. Patent Office, or by any other of the Patent Offices that requires a strict examination of applications, such as the German, Austrian, Dutch, or Swedish Patent Office. If a British or French patent clearly discloses on its face the invention in question, it is undeniably as good a reference as a U. S. patent. However, long experience with vague, speculative, prophetic, and unduly inflated statements contained in a large proportion of French and British patents, particularly the French patents, has led the Courts to examine such references critically and suspiciously, and to insist that they are references *only* for what they clearly disclose and *not* for what may be made out of them in view of the later patent or application in dispute. (*Westinghouse* v. *Great Northern*, 88 Fed. 464; *General Electric* v. *Hoskins,* 224 Fed. 361; *Haynes Stellite* v. *Chesterfield,* 22 F. (2d) 635, at 638; *In re Cross,* 62 F. (2d) 182.) It is in such an attitude of mind that the references in the present instance must be considered.

The Board of Appeals (page 62, line 15), the Solicitor for the defendant, (page 20, line 24), and the Honorable District Court, (pages 13 and 14), relied wholly on two of the four cited patents to anticipate the plaintiff's claims: Hadfield French patent 590,691 and Commentry French patent 666,789. Acordingly, in the following discussion, but little attention will be paid to the Hadfield British patent and the Greaves British patent.

Hadfield French Patent 590,961.

The French patent to Sir Robert A. Hadfield contains the disclosure of a meritorious invention by a famous metallurgist, to wit, the addition of silicon, or of tungsten and copper, or of all three materials, to the previously known corrosion-resistant chromium-nickel steels of the kind commonly known as "18-8" (about 18% chromium and 8% nickel), for the purpose of improving the strength of these steels, and their resistance to scaling and oxidation, at the high temperatures encountered, for example, in furnaces and internal combustion engines. Tungsten imparts the strength and silicon and copper impart the oxidation resistance, at elevated temperatures.

If, as is required in the patent offices of the United States and other countries where a strict examination is made, Hadfield had confined his specification to the specific improvement and such parts as necessarily cooperate with it, his patent would not have been properly cited in the present case, because the present invention involves the use of far more manganese than the patent, and omits tungsten and silicon altogether. But the French law imposes no such restrictions: French applications are not examined for the substance of what is disclosed or how it is disclosed, they are merely registered, assigned a number, and then printed. Accordingly, the patentee Hadfield liberally inflated his specification, and his assertion of monopoly goes far beyond the disclosure of his actual invention. That this is so is clearly to be seen from a comparison of the ranges of proportions of the constituents in his broad statement of monopoly with those in his specific examples (pp. 46 and 47):

Constituent	*Examples*	*Broad Statement*
% Chromium	19.6 to 22.2	5 to 25
% Nickel	6.82 to 7.75	5 to 20
% Manganese	0.39 to 2.56	0 to 8
% Copper	2.07	1 to 6
% Silicon	0.53 to 1.81	1 to 10
% Carbon	0.13 to 0.51	0 to 1
% Tungsten	3.93 to 4.76	1 to 10

Any metallurgist would immediately recognize the fact that the properties of the compositions of the examples are not typical of the entire broad range. It is absurd to say that the same kind of material is obtained with 5% chromium and 25% chromium, or with 5% nickel and 20% nickel, or with 1% and 10% silicon or tungsten: that would be absurd even to one who knew nothing about metallurgy. The practical effect of this great difference in breadth of ranges of the examples and of ranges of the statement of monopoly is *to limit that portion of the disclosure which can reasonably be relied upon to the specific examples. These examples are not the same as appellant's claimed steel.*

The objects of this Hadfield invention are concisely stated in the résumé of the patent (p. 48) to be the production of alloys and articles:

> (1) considerably resistant to oxidation and scaling at high temperatures,
>
> (2) considerably resistant to the action of air, fresh and sea water, and various acids, and
>
> (3) having high tensile and compression strength at elevated and ordinary temperatures.

Specific articles mentioned are furnace elements, valves, turbine blades, and other machine parts.

The enumerated properties are characteristic of numerous *materials which are corrosion resistant but not stain-resistant, and of materials which are strong but not suitable for deep-drawing.* The enumerated articles are invariably made by *casting or hot working and not by deep-drawing.*

Commentry French Patent 666,789.

The sole contribution made by the Commentry French patent 666,789 is the substitution of a part of the nickel in the known "18-8" chromium-nickel steel by the cheaper element, manganese, while the nickel content is always maintained more than the manganese content (p. 49, third paragraph *from bottom*). The alloys are stated to be:

(1) Resistant to corrosives, for instance, sea water and various acids.

(2) Strong and ductile, shock resistant, and

(3) Easily worked by rolling or forging between 1150° and 850° C.

Typical articles mentioned in the patent are wire-drawn filaments, tubs, containers, tubes, pumps, etc. *All of the articles mentioned in the patent are ordinarily made by hot-working and not by deep drawing.* And, as pointed out before, *resistance to corrosion does not mean stain resistance.*

The only mention of copper in this patent appears on page 50, lines 9 to 12, (Record), where it is stated prophetically that "The resistance of these alloys to certain corrosives can be improved by additions of Cu and Mo together or separately, a content of 6% of each of these elements being, in general, sufficient".

The British Patents.

The *Hadfield British patent* (pp. 43 to 44) describes substantially the same invention as that in the above-discussed Hadfield French patent, the only notable differences being a significant restriction of the ranges of composition and the insertion of a definite statement that tungsten must always be present. Moreover, the upper limit of manganese is placed at 4%, and the example containing the most manganese has only 0.53% of this element: this is to be contrasted with the limits of 3% to 12% manganese claimed by the appellant. None of Hadfield's examples are within appellant's claims either in composition or in properties.

Inasmuch as the Patent Office Board of Appeals was of the opinion (p. 62, lines 15 to 17) that this patent does not anticipate the claims, and inasmuch as the Honorable District Court did not find to the contrary, it is believed that an extended discussion of the Hadfield British patent is not required here.

It is not apparent to the plaintiff why the defendant has continued to cite the *Greaves British patent 117,286,* because this relatively old patent is not pertinent to the issues and has never been urged as an anticipation of the plaintiff's claims. The Examiner cited this patent merely to show that manganese can be added to stainless steels containing chromium, nickel, etc. (p. 54, lines 8 and 9). The Board of Appeals wholly ignored the patent, as did the Honorable District Court below. No steel even faintly resembling the one claimed by the plaintiff is suggested by Greaves. Therefore, this patent will not be discussed further herein.

References are Merely Speculative.

Examination of the two French patents discussed above shows that the portions relied upon by the defendant and the Court below to anticipate plaintiff's claims are merely speculative, inflated extensions of the invention illustrated by the specific examples in the patents.

In the Hadfield French patent, although the highest manganese content shown in the examples is 2.56%, and the manganese content is only a fraction of 1% in all examples except one, the patent glibly states that the invention includes alloys containing up to 8% manganese. It is only in this statement that the defendant professes to find a disclosure of the high manganese alloys with which plaintiff's claimed invention is concerned. Similarly, although this Hadfield French patent gives only one example containing copper, and this also contains tungsten and silicon (examination of the similar Hadfield British patent shows definitely that the inventor did not seriously contemplate adding copper in the absence of tungsten and silicon), the patent asserts that the invention includes alloys containing 1% to 10% tungsten *or* up to 6% copper *or* both of these elements together. When it is shown (p. 22, lines 19 to 36; p. 32, lines 18 to 20; p. 38, lines 30 to 34) that more than 3% copper makes the steel unforegable, and therefore unworkable even in the hot state, one is forceably reminded of the statement by the Court of Appeals for the Second Circuit (*Westinghouse Air Brake Co.* v. *Great Northern Ry Co.*, 88 Fed. 258; cited and approved in *General Electric Co.* v. *Hoskins Mfg. Co.*, 224 Fed. 258, at 263), speaking of an alleged anticipating English patent:

> *"The prophetical suggestions in English patents of what can be done, when no one has ever tested, by actual and hard experience and under the stress of competition, the truth of these suggestions, or the practical difficulties in the way of their accomplishment, or even whether the suggestions are feasible, do not carry conviction of the truth of these frequent and vague statements."*

The Commentry French patent is, if anything, even more inflated than the Hadfield patent. Moreover, the patent is self-contradictory. Although it is clearly stated in this patent (p. 49, lines 9 to 11 from bottom that nickel is replaced by a *smaller* amount of manganese, the single example (p. 50, third full paragraph) contains about twice as much manganese as nickel. Furthermore, although the single example contains only iron, chromium, manganese, nickel, carbon, and nominal silicon, it is glibly predicted (p. 50, first full paragraph) that the resistance of the alloys to certain corrosives (what corrosives?) can be improved by the addition of up to 6% of copper or molybdenum together or separately. In similar fashion, it is suggested that up to 3% silicon and unspecified amounts of aluminum, vanadium, titanium, or zirconium may be added, and that part or all of the nickel may be replaced by cobalt. The remarks made in the preceding paragraph apply with at least equal force to this Commentry French patent.

Accordingly, it is respectfully submitted that these references cannot be considered a fair teaching of any kind of material approximating that claimed by the plaintiff, even in respect to the "broader range of percentages of the corresponding elements" referred to by the Board of Appeals (p. 62, lines 13 and 14).

Plaintiff Secures a New and Unobvious Result.

The Patent Office Board of Appeals gave as their opinion that plaintiff's claims would be patentable over the cited references if it were shown that plaintiff has secured an "unobvious or new result of a very striking and distinctive nature such as would be considered to amount to a discovery of a new property or mode of action in the alloy under certain conditions" (p. 62, lines 21 to 24). Inasmuch as the Board of Appeals practically admitted that plaintiff's results were unobvious and required extensive research (p. 63, lines 28 to 30), it would appear that the Board's chief difficulty was in understanding that plaintiff's new result is so striking and distinctive that it would be considered to amount to a discovery of a new property or mode of action under certain conditions. Accordingly, a substantial part of the testimony for the plaintiff before the District Court below was devoted to the establishment of the fact that the results obtained by plaintiff not only are unobvious, but also amount to the discovery of a new property and a new mode of action under certain conditions.

It is submitted that the uncontroverted testimony for the plaintiff adequately establishes that:

1. A stain-resistant steel which can be deep drawn (severely cold-worked) is a rarity, only one such material having been available commercially before plaintiff's invention (p. 21, lines 30 to 35);

2. Although plaintiff is a metallurgist of long experience (p. 25, last paragraph, to p. 26, line 19) who has been actively engaged in research on iron-chromium-manganese steels since about 1912 (p. 25, lines 20 to 28), he was unable, on the basis of that wide knowledge and experience, to predict whether or not *any* iron-chromium-manganese type steel could be made which would be both stain-resistant and deep-drawing (p. 25, lines 25 to 38).

3. The fact that there are six essential components in the steel of the present invention greatly complicates the problem of predicting, without experimentation, the properties of the material (p. 27, lines 1 to 11). As a result, over 200 steels of the chromium-manganese type were made and investigated in the work that resulted in the discovery on which the present invention is based (p. 21, second paragraph).

4. The proportions discovered by plaintiff to give the new properties discovered by plaintiff are critical, in that a substantial departure therefrom results in failure to secure the new properties (p. 21, line 35, to p. 23, line 22; p. 25, second and third full paragraphs; Plaintiff's Exhibits 2, 3 and 4).

These facts, it is urged, clearly establish the patentability of plaintiff's claimed invention.

Becket and Armstrong Claim Same Invention.

The defendant insists that Armstrong patent 1,962,702 (pp. 37 to 39) is patentable over the above-discussed French patents. In this, the plaintiff concurs; but insists that the defendant's simultaneous position, that plaintiff's claims are unpatentable, is wholly untenable, for the reason that Armstrong and the plaintiff disclose and claim the same invention.

That the inventions are the same, or at least that plaintiff's invention is embraced in Armstrong's patented claims, is obvious from a comparison of the ranges of composition limits in the two cases:

	Armstrong	Becket
% Chromium	12 to 30	16 to 22
% Manganese	2 to 12	3 to 12
% Nickel	7 to 30	2 to 11
% Ni plus % Mn	9 to 42	6 to 14
% Copper	1 to 3	0.25 to 3
Ratio % Mn to % Cu	1 to 4	at least 1

As to *chromium* content, Becket's range is entirely within Armstrong's range, and Armstrong's specific examples (p. 38, lines 45 to 70) are squarely within Becket's range.

As to *manganese* content, Becket's and Armstrong's ranges are almost identical.

The *nickel* content of Armstrong overlaps to a large extent the nickel range of Becket, and 13 of the 17 specific examples mentioned by Armstrong fall squarely within Becket's range.

The *copper* contents of Becket and Armstrong overlap considerably, having the same upper limit and differing in lower limit by only three quarters of 1%. All of Armstrong's examples fall entirely within Becket's claimed range.

The *sum* of the *nickel* plus *manganese* specified by Becket overlaps that of Armstrong, and in 10 of the 17 examples mentioned by Armstrong the sum of nickel and manganese falls squarely within Becket's claimed range.

The *ratio* of *manganese* to *copper* stressed by Armstrong is between 1 and 4; but it appears that the upper ratio of 4 is not critical but merely preferred: it is essential only that the manganese shall not exceed 12% (p. 37, lines 84 to 97). Becket specifies a ratio of manganese to copper of at least 1 (since the upper limit of copper, and the lower limit of manganese are each at 3%) and further specifies that the manganese should not exceed 12%.

As far as composition limits are concerned, Armstrong's and Becket's inventions overlap to so large an extent that it cannot possibly be true that Armstrong's claims are patentable while plaintiff's are not, particularly in view of the fact that *Armstrong filed his application three years later than plaintiff.*

Moreover, the characteristics of Armstrong's alloy, as set forth in his claims, are obviously those of the present plaintiff:

> 1. A stable surface resistant to sulfuric acid, i.e. corrosion resistant;
>
> 2. Resistant to phase change when quenched from high temperature and submitted to severe cold work, i.e. capable of deep drawing;

3. Of good forgeability and machineability;

4. Resistant to intergranular corrosion.

Of these characteristics, the only one not specifically mentioned in the plaintiff's specification is the resistance to intergranular corrosion. This latter characteristic, however, is obviously inherent in the claimed ranges of composition, and not due to any special treatment. Accordingly, the patentability of the invention is based on the discovery of the new ranges producing new results, and not on the results themselves. (*Wemple and Daesen* v. *Peirce and Anderson*, 22 C. C. P. A. 1064, at 1065.)

On the face of the respective disclosures, the Armstrong and Becket inventions appear to be the same, the chief difference being that Becket's claims are more carefully restricted than Armstrong's.

Any doubt which might remain of the identity of the inventions is destroyed by the uncontroverted testimony of the expert witnesses Franks and Becket (p. 23, last paragraph, to p. 25, line 5; p. 27, first and second full paragraphs) and plaintiff's exhibits 5 and 7. By all common tests, and by microscopic examination, the materials claimed by Armstrong and Becket are identical.

The only possible conclusion is that the invention claimed by the present plaintiff is patentable.

It is important to observe in this connection that the Honorable District Court, although diligent in its attempt to discover a difference in principle between the Armstrong patent and the plaintiff's invention (p. 27, last 3 lines to p. 28, line 34), never did find any such difference, but dismissed the plaintiff's Bill notwithstanding. The only concrete suggestion made by the defendant's counsel of wherein a difference might lie, was offered after both parties had rested their cases and as an afterthought by way of argument, which the plaintiff, of course, had no opportunity to controvert. This suggestion was that Armstrong's entire invention lies in his limitation of the use of copper as compared to manganese (p. 28, 7th line from bottom, to p. 29, line 6), and that Becket does not disclose this limitation. As shown herein above, such a contention is untenable: the essential relationship between manganese and copper, as disclosed by *both* Armstrong and Becket, is that the manganese shall exceed the copper, but be less than 12%. Armstrong's further limitation. that the manganese shall not be more than four times the copper, is merely a preferred limitation which, by his own disclosure and by the testimony of the witness Franks, *is not a critical limitation which effects a change in kind.* Therefore, to say that Armstrong's invention is patentably different from Becket's is absurd, because, if patentability depends upon a change in proportions, the new proportions must be critical in the sense that a substantial departure from the new proportions will result in failure to obtain the new or enhanced qualities. (*Bethlehem Steel Co.* v. *Churchward, supra; Darwin & Milner* v. *Kinite Corporation, supra; In re Pilling,* 18 C. C. P. A. 703; *In re Lothrop,* 19 C. C. P. A. 1183; *In re Dreyfus,* 22 C. C. P. A. 830; *In re Wells,* 19 C. C. P. A. 1044.)

How Errors Arose.

It may well be wondered how it happened that the Patent Office made such grave errors. The record offers a very reasonable explanation. The Board of Appeals was not convinced by appellant's proofs that the results are striking and of a distinctive nature (p. 63, last paragraph); but when Armstrong came along, he made a showing which convinced the Examiner that the results are striking (p. 29, lines 2 to 6). Armstrong's case was allowed, and appellant's rejected, because of differences in the persuasive effect of their respective arguments, and not because of any differences in the inventions disclosed. Thus arose the first error.

The second error was made when the Patent Office failed to recognize the essential identity of the Becket and Armstrong inventions. The reason for this is likewise not hard to discover: whereas appellant disclosed his invention in simple, straightforward language defining the new composition in terms of percentages and properties alone, Armstrong introduced an element of mystery by specifying proportions of manganese to copper which, although superficially introducing a critical limitation to the scope of the claims, actually become of little or no significance when carefully examined. When dealing with technical subject-matter, it is very easy to confuse differences in words with differences in substance, particularly in a relatively new and complicated art like that of the stainless steels. Neither the Examiner nor the Board of Appeals had the benefit of the assistance of an experienced metallurgist: the testimony of the witness Russell Franks in the present record supplies this deficiency and now makes it perfectly clear that the inventions are, in substance, identical.

Summary and Conclusions.

In respect to a composition of matter, patentability may reside in a change in the number and kind of constituents, in a change in the proportions of the constituents, or in a change in the physical structure, provided that the change in question results in a new material having either entirely new or at least substantially enhanced qualities of utility. (*Bethlehem Steel Co.* v. *Churchward,* 268 Fed. 361, at 364; *Pittsburgh Iron & Steel Co.* v. *Seaman-Sleeth Co.,* 248 Fed. 705, at 708 and 709; *American Stainless Steel Co.* v. *Ludlum Steel Co.,* 290 Fed. 103; *Haynes Stellite Co.* v. *Chesterfield,* 22 F. (2d) 635; *Darwin & Milner* v. *Kinite Corporation,* 72 F. (2d) 437, at 438; *Catalin Corporation of America* v. *Catalazuli Mfg. Co.,* 79 F. (2d) 593, at 597; *Ex parte Crampton et al.,* 21 U. S. Pat. Q. 644, at 645.)

If the change, however apparently minute it may be, is not obvious, and results in marked advantages, a patentable invention has been produced, and when the history of the art is such that the inducement to make the change is very great, by reason of its value, and the change remains unmade for a considerable time, despite the availability of the references, that is evidence approaching the conclusive that the change is not obvious. (*Ex parte Champney*, 1892 C. D. 176, at 178; *Loom Co.* v. *Higgins*, 105 U. S. 580, at 591; *Carnegie* v. *Cambria*, 185 U. S. 403, at 446; *Eibel Co.* v. *Paper Co.*, 261 U. S. 45, at 68; *American Stainless Steel Co.* v. *Ludlum Steel Co., supra*, at p. 105.) If the composition shown by the reference was not designed by its author, nor adapted, nor actually used, for the performance of the functions of the new materials, then the change was probably not obvious. (*Topliff* v. *Topliff et al.*, 145 U. S. 156, at 161; *Ludlum Steel Co.* v. *Terry*, 37 F. (2d) 153, at 159.) If the reference is vague and speculative, or leads away from the new invention in question, or fails to speak affirmatively with certainty in respect to the proportions and results involved in the new invention, the reference is not a sufficient disclosure to teach those skilled in the art how to practice the invention and is not, therefore, an anticipation. (*Westinghouse Co.* v. *Great Northern Co., supra*, at 263; *General Electric Co.* v. *Hoskins Mfg. Co., supra*, at 468; *American Stainless Steel Co.* v. *Ludlum Steel Co., supra*, at p. 105; *Catalin Corporation of American* v. *Catalazuli, supra*, at p. 596; *Ex parte Picard*, 11 U. S. Pat. Q. 64; *Ex parte Miller*, 22 U. S. Pat. Q. 336, at 337.)

The record in the present case clearly shows that plaintiff's claims define a patentable composition of matter characterized by a novel proportioning of its constituents, which results in a new material having new and enhanced qualities of utility. The history of the art shows that the new and enhanced properties are valuable and rare, that only one previously known material possesses a similar combination of properties, and that this previously known material has definite limitations in its field of usefulness; whence it follows that the inducement to make the change was very great. The compositions shown in the references were not designed by their authors, nor adapted, nor actually used, for the performance of the functions of plaintiff's new material. The references are vague and speculative in so far as they relate to the particular ingredients essential to plaintiff's new steel, and fail to speak affirmatively in respect to the proportions and results involved in plaintiff's invention. The defendant's rejection of plaintiff's claims is based wholly on inferences drawn from the disclosure made by the plaintiff's own application. Such inferences, as distinguished from disclosures, especially when drawn in the light of after events, cannot be accepted as the basis of anticipation. A patent relied upon as an anticipation must itself speak. *Its specification must give in substance the same knowledge and the same directions* as the application sought to be anticipated. (*Skelly Oil Co.* v. *Universal Oil Products Co.*, C. C. A., 31 F. (2d) 427; *Root Refining Co.* v. *Universal Oil Products Co.*, C. C. A., 78 F. (2d) 991, at 994.)

Plaintiff's contention that his claims are patentable is strongly supported by the defendant's continued assertion of the patentability of the claims in Armstrong patent 1,962,702, because this patent discloses and claims, in substance, the same invention as that claimed by plaintiff.

WHEREFORE, Plaintiff respectfully urges that the decree of the Honorable District Court should be revised and reversed.

RICHARD L. SCHEFFLER,
Attorney for Appellant.

OF COUNSEL:
RALPH E. PARKER,
EUGENE L. GREENEWALD,
WARREN J. WILLIS.

UNITED STATES
COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA
FILED DEC 12 1936

No. 6790

In the United States Court of Appeals for the District of Columbia

FREDERICK M. BECKET, APPELLANT

v.

CONWAY P. COE, COMMISSIONER OF PATENTS,
APPELLEE

APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA (NOW DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA)

BRIEF FOR THE COMMISSIONER OF PATENTS

R. F. WHITEHEAD,
Solicitor, United States Patent Office.

In the United States Court of Appeals for the District of Columbia

October Term, 1936

No. 6790

Frederick M. Becket, appellant
v.
Conway P. Coe, Commissioner of Patents,
appellee

APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA (NOW DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA)

BRIEF FOR THE COMMISSIONER OF PATENTS

This is an appeal from the decree of the lower court (R. p. 15) dismissing a bill in equity brought under the provisions of Section 4915 R. S. (35 U. S. C. 63), in which plaintiff, as assignee, sought to have the Commissioner of Patents authorized to issue a patent on the application of Frederick M. Becket, its assignor, containing claims 9, 10, and 11, set out in paragraph 7 of the Bill (R. pp. 3, 4), and claim 12, set out in paragraph III of a supplemental bill (R. p. 9).

Claims 9, 10, and 11 were held by the Patent Office to be unpatentable over the following prior art:

> Greaves et al., British, 117286, of 1918.
> Hadfield, French, 590691, of 1925.
> Hadfield, British, 313471, of 1929.
> Commentry, French, 666789, of 1929.

Claim 12 was rejected as involving "new matter" and as unwarranted by the disclosure of appellant's application as filed.

Claim 9, which is representative of the first group of claims, reads as follows:

> 9. A stain-resisting iron-base alloy having deep-drawing properties and comprising from about 16% to about 22% of Chromium; about 0.25% to about 2.75% of copper; carbon, the carbon content being not more than about 0.3%; at least about 3% of manganese and at least about 2% of nickel, the sum of the manganese and nickel percentages falling between about 6% and about 14%; the balance of the alloy being substantially iron.

Claim 12 reads as follows:

> 12. A ferrous alloy characterized by its resistance to acid corrosion or intergranular corrosion, by its machineability and forgeability and its stable non-magnetic condition comprising chromium about 18%, nickel about 8%, copper about 1.5% to 3%, manganese about 4% to 6%, carbon not substantially above about 0.15% and silicon less

> than 1%, the balance being substantially all iron.

In the specification of his application in suit, No. 503,328, (R. p. 31) Becket states that his invention relates to alloys containing as essential constituents the metals iron, chromium, manganese, and copper and after referring to his prior application No. 435,957, in which there were described alloys consisting substantially of iron, chromium, and manganese, which comprise deep-drawing properties with high resistance to corrosion, states that these alloys contain about 16% to 22% of chromium, about 5% to 15% of manganese, and up to about 0.3% of carbon.

The alleged improvement over the alloys of the prior application is described as follows:

> I have now found that copper may be added to the alloys of my prior application giving new alloys with desirable properties. Such new alloys, when the copper content is suitably adjusted, are stain-resistant in approximately the same degree as the alloys of my prior application; and while the copper tends slightly to increase the hardness of the alloys, an appropriate addition of copper raises the Erichsen value and gives such a combination of physical properties as to indicate excellent deep-drawing qualities—an inference which is confirmed by actual drawing tests.
>
> By adding copper to the alloys of my prior application it is possible with a

> medium manganese content, say in the vicinity of 8%, to equal or, it seems probable, distinctly to surpass the drawing qualities obtainable without copper by incorporating a higher proportion of manganese. The present invention therefore offers the possibilities of providing still better alloys than those described in my prior application, and of lowering the cost of the alloys by replacing a part of the manganese with the cheaper metal, copper.

It was further stated that the useful range of copper was from 0.25% to 2.50%, that the chromium might vary from 16% to 22%, and that the carbon should be not more than 0.3%, and preferably not more than 0.12%. With reference to the addition of nickel to the alloy, it was said (R., p. 33):

> I have also discovered that by incorporating a substantial proportion of nickel, not less than 2%, with alloys of the type described above, the properties are still further improved; and certain of the resulting compositions are at least equal in workability and stain-resistance to the best comparable irons or steels which have come to my attention. As nickel is added, the manganese content may be correspondingly lowered, but I prefer to have at least about 3% of manganese present. A chromium content of about 18% is most favorable to the ductility of the alloy, and with such a chromium content, the

> sum of the nickel and manganese percentages should be at least 6%, and at least 8% if the ductility is to be raised to nearly its maximum value. Increasing the sum of the nickel and manganese beyond 14% does not, as a rule, improve the properties sufficiently to warrant the additional cost involved. When the chromium content varies much in either direction from 18%, the alloy tends to become less workable—a tendency which can be counteracted in some measure by adding more manganese and/or nickel.

A number of examples of alloys having specified percentages of the various ingredients are given.

It should be noted at this point that all the claims in suit specify an alloy containing nickel and that in claims 9, 10, and 11 fairly wide ranges of proportions of the respective ingredients are given.

The French patent to Commentry, No. 666789 (R. pp. 49–52), discloses an alloy containing 15% to 30% of chromium; 2% to 12% of nickel; 12% to 2% of manganese; and less than 1% of carbon, the remainder iron. It indicates that the sum of the nickel and manganese should be between 8% and 20%. It is also stated that copper or molybdenum, together or separately, may be present up to 6%. A specific example is given in which the ingredients are 0.31% of carbon; 0.30% silicon; 8.72% manganese; 4.92% nickel; 21.20% of chromium, and the rest iron. The patent also states that the alloy may be formed into drawn wires, tubes, etc.

The Hadfield French patent No. 590691 (R. p. 45) describes an alloy having less than 1% of carbon; up to 8% of manganese; 5% to 25% of chromium; 2% to 20% of nickel; 1% to 10% of silicon, with 1% to 10% of tungsten, or its equivalent, molybdenum, or up to 6% of copper.

Appellant attacks the rejection on the ground that he has discovered that his alloys possess the property of being stain resistant and having deep drawing ability. He points out in his brief that stain resistance is fairly easily obtained and deep-drawing ability is easily obtained but states that it is exceedingly difficult to obtain a steel alloy that has both properties.

The witness Franks stated that "stain resistance" is a special kind of corrosive resistance and is a characteristic of "stainless steel." He also stated that "deep drawing" means the ability of a material to be deformed cold, without rupture or setting up strains sufficient to cause subsequent rupture of the material.

Appellant argues that therefore he is entitled to a patent on the claims in suit as covering a radically new material even though the "narrow" range of proportions of the ingredients specified fall within the broader ranges disclosed in prior patents or publications.

He also attacks the references on which the Patent Office relied on the ground that they are vague and indefinite and, except for the specific examples given, merely contain what have been sometimes referred to as "prophetic suggestions" as to what might be done, but lack any definite teaching which would result in an alloy having the properties above referred to.

Alloy steels that are stain resistant were well known prior to the filing of Becket's application. (See testimony of Franks, R. p. 21.)

It was also known that an alloy steel containing chromium loses its stainless characteristics as the chromium is reduced below a certain percentage.

Obviously something more is necessary to establish the patentability of a particular alloy than to have discovered some previously unknown property of it. It must be novel. Otherwise any one could patent an alloy which had been fully disclosed in the prior art by finding that it had a property which had up to that time escaped observation. Moreover, in order that such an alloy falling within the ranges specified in the prior art could support a patent it would certainly have to be established that it constitutes an entirely new metal. It would, it is submitted, also be necessary that it be such that it could not have been obtained by following the teaching of the prior art.

In *Bethlehem Steel Co.* v. *Churchward International Steel Co.,* 268 Fed. Rep. 361, the Court in passing upon the validity of a patent on an alloy steel said:

> * * * But novelty of proportions in the sense of the patent law involves something more than figuring out proportions differing from any that were known before. It involves new results from new proportions, developing a new metal, or, it may be, an old metal with new characteristics of structure or performance, embracing entirely new, or at least substantially enhanced, qualities of utility. (Citing decisions.)

See also *Pittsburgh Iron & Steel Foundries Co.* v. *Seaman-Sleeth Co.*, 248 Fed. Rep. 705.

The Board of Appeals was of the opinion that no such striking and unobvious results had been shown as would justify a holding that applicant had produced a new metal. The testimony in the case does not, it is submitted, establish that the characteristics of appellant's alloy were so different from the described characteristics of the references as to establish that appellee had produced a "new metal."

It is not necessary in this case to consider the theory of patentability of an alloy having somewhat restricted ranges of proportions falling within the wide ranges disclosed in the prior art, for a comparison of the specific examples given of applicant's alloy with the specific example of the Commentry patent shows no further departure from the alloy of the latter patent than falls within the skill of the art.

The carbon content given in the specific example of the French patent to Commentry and in claim 9 in suit is, respectively, .31% and not more than about .3%, the manganese content, 8.72% and about 3% to 12%; the nickel content, 4.92% and over 2% to 11%. It is also stated in that patent that the sum of the nickel and the manganese should be between 8% and 20%, while claim 9 specifies between 8% to 14%. In the specific example of Commentry no copper is included but it is stated that up to 6% might be employed.

The only reason for limiting the amount of copper is in order that the metal may be worked hot and it was known when Becket filed his application that hot workability disappears if copper increases beyond the limit of the solid solubility of copper in steel. (See R. p. 25, lines 18 and 19.) To include copper in the alloy is clearly suggested by the French patent and it was but following the teaching of the art to limit the amount so used.

A similar comparison can be made between the claims in suit and the disclosures of the specific examples of the Hadfield French patent, as shown below:

	Carbon	Copper	Manganese	Nickel	Chromium
Hadfield:					
Specific example	.13% to .51%.	2.07%	.39% to 2.56%.	6.82% to 7.75%.	19.6% to 22.2%.
Range	Up to 1%	Up to 6%	Up to 8%	5% to 20%.	5% to 25%.
Becket's Claim 9	Not over 0.3%	.25 to 2.75%.	3% to 12%.	2% to 11%.	16% to 22%.

It is submitted, therefore, that applicant had but followed the teachings of these patents in the light of what was known as to the limitations of the amount of copper to be added to the alloy and still have a metal which is workable when hot.

As to the alleged vagueness of the cited patents, it is to be noted that Becket in his application broadens his ranges over the specific examples given, equally as much as in the patents cited. For example, the range of manganese given in the specific example in the application is 5.30% to 6.70% while the range set out in claim 9 is 3% to 12%. In other words, a range of 1.4% in the specific example is made a basis for a range of 9% in claim 9.

The question of appellant's right to make claim 12, copied from the Armstrong patent, rests upon a different basis. Admittedly appellant does not describe in his application an alloy having the specific proportions of the ingredients set out in the claim copied from the Armstrong patent, nor does he give a specific example having those proportions.

In his patent Armstrong specifies certain characteristics of his alloy, and on page 1 of the patent, lines 62 et seq. (R. p. 37) it is said:

> It will also be found that the resistance of my alloy to the action of sulphuric acid is increased phenomenally and its resistance to intergranular corrosion has been enor-

> mously increased. This latter feature is a very surprising factor for manganese certainly does not improve the intergranular corrosion and apparently lowers it, and the action of copper alone in this regard is very slight and practically negligible; copper and manganese additions will not produce my results unless the copper and manganese content have a definite relationship to one another.
>
> The improvement in intergranular corrosion first is observed at the point where the manganese is about equal to the copper and as the manganese proportion is increased becomes more and more noticeable.

In his Statement in answer to the second appeal (R. pp. 57–60) the examiner points out what it was that Armstrong had discovered as to the resistance of his alloy to intergranular corrosion (See R. p. 59), and it is evident from that Statement that the holding as to the lack of right of Becket to make the copied claim was based on the fact that he had not claimed to have made any such discovery or to have set out any specific example within the narrow ranges of the proportions set out in the copied claim.

Had any question been raised in the Patent Office on that point the record of the Armstrong applications—the one on which the patent was actually issued and the one referred to therein—would have shown the correctness of the examiner's statement.

The argument that Becket has the right to make the claim is based only on the ground that his application shows ranges of proportions within which the proportions stated in the claim of the Armstrong patent fall.

It is deemed desirable to briefly point out what is meant by "intergranular corrosion" and in order to do this it will be necessary to refer briefly to the structure of metals. When molten metals cool to the solidification temperature tiny crystals begin to form at many points and these crystals continue to grow as the temperature drops. These crystals would have a regular geometric shape if it were not for the interference of adjacent crystals. The result is that the metal is composed of many irregularly shaped crystals with random orientation held together in some unknown manner. The crystals are called grains. Sometimes these grains are large enough to be seen readily with the naked eye, while other times they are microscopic. The appearance of metal etched so as to reveal the grains is much like rough stone masonry (rubblework), where the irregularly shaped pieces of stone represent the grains and the mortar the material or whatever it is that holds the grains together.

Intergranular corrosion occurs in some metals, notably austenitic chromium-nickel steels, after having been heated to 500° to 800° C. The corroding fluid destroys the bond between individual grains so that the metal loses its characteristic ring and in extreme cases may be crumbled with the hand.

The testimony offered by plaintiff, appellant here, in this case makes no reference to intergranular corrosion. Nothing was offered to show that the alloy of claim 6 of the Armstrong patent, claim 12 of Becket's application, does not have the characteristics set out in the above quotation from the patent. Furthermore, no testimony was offered to show that the alloys falling within the ranges specified in Becket's application are especially resistant to intergranular corrosion. Nor does the record show that appellant had any conception that an alloy having the constituents of claim 6 of the patent in the proportions stated therein would have any such characteristics.

It is therefore submitted that claim 12 was properly rejected in the Becket application.

It is further submitted that the Bill was properly dismissed by the lower court and that the decree of that court should be affirmed, with costs against the appellant.

R. F. Whitehead,
Solicitor for the Patent Office,
Attorney for Appellee.

December 1936.

U. S. GOVERNMENT PRINTING OFFICE: 1936

FOR MR. JUSTICE GRONER

UNITED STATES
COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA
FILED MAR 8 - 1937
CLERK

In the

United States Court of Appeals

For the District of Columbia.

October Term, 1936.

No. 6790.

FREDERICK M. BECKET,
Appellant,

v.

CONWAY P. COE, Commissioner of Patents,
Appellee.

Appeal from the Supreme Court of the District of Columbia (Now District Court of the United States for the District of Columbia.)

REPLY BRIEF FOR APPELLANT.

Richard L. Scheffler,
Attorney for Appellant.

Of Counsel:

Ralph E. Parker,
Eugene L. Greenewald,
Warren J. Willis,
Donald C. Harrison.

IN THE

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA.

October Term, 1936.

FREDERICK M. BECKET,
Appellant,

v.

CONWAY P. COE, Commissioner of Patents,
Appellee.

No. 6790.

APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA (NOW DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA).

REPLY BRIEF FOR APPELLANT.

By way of reply and rebuttal, appellant respectfully submits the following comments to the brief for the Commissioner of Patents.

It is observed that appellee's brief refers to appellant as an assignee of the inventor. This is incorrect. The appellant in this case is the inventor himself.

Throughout the appellee's brief, reference is made to alleged "fairly wide ranges of proportions of the respective ingredients" specified in appellant's claim. Such an allegation is wholly without foundation. Appellant's claims call for a spread of percentages which is extremely narrow when compared with those specified in the prior art patents or in

Armstrong patent 1,962,702, as may readily be seen from the following tabulation of the width of range of percentages in each case.

	% Chromium	*% Manganese and Nickel*	*% Copper*	*% Carbon*
Appellant	6	8	2.5	0.3
Armstrong	18	32	2	0.3
Commentry	15	12	6	1
Hadfield (Fr.)	20	22	6	1
Hadfield (Br.)	25	22	4.8	0.95
Greaves	18	25	None	0.4

Appellant heartily agrees with the following language appearing on page 7 of the brief for the Commissioner:

> "Obviously something more is necessary to establish the patentability of a particular alloy than to have discovered some previously unknown property. It must be novel. Otherwise any one could patent an alloy which had been fully disclosed in the prior art by finding that it had a property which had up to that time escaped observation."

This very language and principle are applicable in rebuttal of appellee's argument that Armstrong's claims are to ~~be~~ a different invention than appellant's because Armstrong discovered a *single* property of his alloy (resistance to intergranular corrosion) not disclosed by appellant. As was clearly stated in *Wemple and Daesen* v. *Peice and Anderson*, 22 C. C. P. A. 1064 (cited in appellant's main brief), the identity of invention in alloy cases depends upon the actual identity of the materials in question and not upon whether one of the inventors mentions a single obscure property not mentioned by the other party. As between Armstrong and appellant, the inventions are identical, and appellant's application should be put in interference with Armstrong's patent.

Appellant likewise agrees completely with the principle enunciated in the case of *Pittsburgh Iron & Steel* v. *Seaman-*

Sleeth, 248 Fed. 705, quoted in the brief for appellee, that invention in alloy cases involves new results from new proportions, developing a new metal, or an old metal with new characteristics of performance embracing new or substantially enhanced qualities of utility. That is precisely what appellant and Armstrong have accomplished over the prior art. Nothing in the prior art teaches the production of a stain-resisting, deep-drawing steel suitable for use in the many articles for which appellant's alloy is suited. Without appellant's or Armstrong's teaching, the new material would never have become known. Appellant has truly enriched the art, and, in seeking the allowance of claims 9 to 12 and the declaration of an interference between appellant and Armstrong, is seeking only the reward to which he is entitled under the patent statutes.

Wherefore, appellant respectfully asks that the decree of the Honorable District Court be revised and reversed.

RICHARD L. SCHEFFLER,
Attorney for Appellant.

Of Counsel:

RALPH E. PARKER,
EUGENE L. GREENEWALD,
WARREN J. WILLIS.
DONALD C. HARRISON.

UNITED STATES
COURT OF APPEALS FOR TH
DISTRICT OF COLUMBIA
FILED DEC 16 1937
Morgan H Beach
CLERK

IN THE

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA

Docket No. 6790
October Term, 1937

FREDERICK M. BECKET,
Appellant,

v.

CONWAY P. COE, COMMISSIONER OF PATENTS,
Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

SUPPLEMENTAL BRIEF FOR APPELLANT
(on Rehearing)

RICHARD L. SCHEFFLER,
Attorney for Appellant.

RALPH E. PARKER,
EUGENE L. GREENEWALD,
DONALD C. HARRISON,
Of Counsel.

IN THE

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA.

FREDERICK M. BECKET, Appellant, v. CONWAY P. COE, Commissioner of Patents, Appellee.	No. 6790. October Term, 1937.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

SUPPLEMENTAL BRIEF FOR APPELLANT (on Rehearing)

Appellant respectfully submits the following summary of the specific issues and points which will be discussed on his behalf at the rehearing in this cause. For a more detailed consideration of the several matters summarized below, reference may be made to appellant's briefs filed heretofore. Unless otherwise noted, page numbers herein refer to the Transcript of Record.

The Cause.

This is a rehearing of an appeal from a decision, rendered without opinion, of the United States District Court for the District of Columbia dismissing a Bill of Complaint and a Supplemental Bill of Complaint brought by Frederick M.

Becket, a citizen of the United States, against Conway P. Coe, in the latter's official capacity as Commissioner of Patents of the United States. This appeal was heard by the full Court, but the decision on appeal was by an equally divided Court, without opinion, Mr. Justice Van Orsdel having died before the date of the decision.

Both the Bill of Complaint and the Supplemental Bill of Complaint were duly filed under the provisions of the Revised Statutes, Section 4915. The cause is concerned with the refusal of the Commissioner of Patents to grant a patent on a single application for Letters Patent, Serial No. 503,-328, filed on December 18, 1930, by the plaintiff (appellant), Frederick M. Becket.

The original Bill relates specifically to claims 9, 10 and 11 of the application and the Supplemental Bill relates to claim 12 copied from U. S. Letters Patent 1,962,702 issued on June 12, 1934, to Percy A. E. Armstrong.

The Invention.

The invention involved in this cause is a new and useful alloy steel.

Steel consists chiefly of iron containing a small amount of carbon. If steel is melted, almost any metallic or nonmetallic chemical element may be dissolved in it, although the solubility of some elements is much greater than that of others. If the steel is then properly cooled and solidified, such dissolved materials are "alloyed" or maintained in a more or less homogeneous distribution within the steel. The resulting solution or mixture is called an "alloy steel".

The presence of alloyed ingredients often profoundly alters the physical and chemical properties of the steel, for instance its strength, ductility, toughness, hardness, and resistance to corrosion.

The properties of an alloy steel depend not only on the kind of alloyed ingredient or ingredients present but also on the number of such ingredients and the percentage of each ingredient. A relatively small change in the amount of even a single ingredient may considerably alter the properties of the alloy steel, and the effect of a given percentage of an ingredient is usually profoundly affected by the kinds and amounts of other alloying ingredients present in the steel. It is this ready mutuability of alloy steels which has led to their widespread use in the arts, for metallurgists have been able to develop many dozens of different kinds of materials, each characterized by unique properties which adapt it to a particular field of use in the arts.

The art of alloy steels is, from a technical standpoint, an extremely complex one. The possible combinations of metals is so numerous, and the effects of a composition change often so drastic, that formulation of general rules for any but the simplest combinations is a tremendous task. It is not often possible, on the basis of knowledge of the effects of an addition of a given amount of an alloying ingredient on one kind of steel, to predict either the effect of a different amount of that ingredient on the same steel, or the effect of the same or different amount on another kind of steel. As the number of ingredients increases beyond two or three, the prediction of the properties of an uninvestigated steel becomes wholly impossible (p. 27, ll. 1 to 11). The art of alloy steels is at present largely empirical.

The present invention deals with a highly complex alloy steel containing *six* ingredients: iron, carbon, chromium, manganese, nickel, and copper. What appellant has discovered is a novel specific proportioning of these six ingredients which results in a new kind of alloy steel characterized by novel properties which adapt the material to a broad new field of utility.

The novel proportions of the ingredients are as set forth in claim 9 (p. 2), as follows:

Chromium	16% to 22%	
Copper	0.25% to 2.75%	
Carbon	Not over 0.3%	
Manganese	At least 3%	Sum between 6% and 14%
Nickel	At least 2%	
Iron	Remainder	

All of the alloy steels falling within these composition limits are identical, in the sense that no marked differences between the properties of such steels can be detected by metallurgical testing methods (p. 23, ll. 29 to bottom; p. 27, second full paragraph); *whereas substantial departure from these limits will result in a different kind of material having different properties* (p. 22, ll. 9 to 12).

Appellant's claims are Patentable over Prior Art.

Appellant's main brief and reply brief point out in detail wherein appellant's claims, here in issue, deal with a practical problem, and a solution to that problem, not even considered in the prior art patents cited by the appellee. It is there pointed out that the cited patents, all foreign, contain language which is broad enough to *include* certain of appellant's compositions, but are so vague that they actually *disclose* nothing about such compositions. In typical foreign patent fashion, each reference patent discusses one kind of material, illustrated by a few examples, and then calmly asserts claim to composition limits broad enough to include not only the actual invention but also many other kinds of materials (including appellant's) which the patentee never investigated and therefore could not describe. No patent of reference in the present case describes, by its outstanding and obvious properties, the kind of alloy steel claimed by appellant.

The principal foreign countries, including Germany where the standard of invention is high as to both novelty and technical importance of the subject matter, have granted patents on applications corresponding to that involved in this cause. Licenses have been taken by several leading European steelmakers who are actively using the invention and paying substantial royalties.

For present purposes, however, it is not necessary to go deeply into the technical aspects of novelty of invention in this case, because appellee has admitted all of the facts necessary to support a conclusion that appellant should prevail in this cause.

Appellee and Appellant Agree on Principles Involved.

The range of percentages set forth in each of appellant's claims falls within the broader range of percentages of the corresponding elements in the references Commentry French patent 666,789 (p. 49) and Hadfield French patent 590,691 (p. 45), but the references Greaves and Etchells British patent 117,286 (p. 41) and Hadfield British patent 313,471 (p. 43) are not relevant even to that extent (p. 62, l. 12 to l. 19; p. 14, l. 1 to l. 8).

It is established law that particular association of elements in particular proportions in an alloy may be allowable over a broader disclosure in the art, where it is proved that some new and unobvious kind of material is secured (p. 64, last 3 lines to p. 65, l. 2; p. 62, ll. 20 to 24).

On this latter principle, the Patent Office issued patent 1,962,702 (p. 37) to Percy A. E. Armstrong, although, just as in appellant's case, the range of percentages set forth in each of Armstrong's claims falls within the broader range of percentages of the corresponding elements in the references Commentry French patent 666,789 and Hadfield French patent 590,691, *supra* (p. 13, Findings of Fact Nos. 4 and 5). Armstrong obtained a new and unobvious kind of material.

Armstrong's claims 1 to 8 and appellant's claims 9 to 12 *define the same new kind* of alloy steel, with the same six ingredients, and with composition limits which are similar except that *Armstrong's limits are in some respects wider* than appellant's (Aplt.'s main brief, table on p. 16, and Aplt.'s reply brief, table on p. 2, summarizing data in Record; p. 13, Findings of Fact Nos. 1 and 4).

Armstrong patent 1,962,702 (p. 37) was issued by the Patent Office on an application filed long after appellant's application: hence the prior art cited against appellant was equally available against Armstrong. The Commissioner of Patents takes the positive position that the Armstrong patent was correctly issued. Accordingly, if appellant has shown on the record herein that his invention is identical with that patented to Armstrong, and that his invention produces the same unobvious results as Armstrong, it necessarily follows that appellant is entitled to an opportunity to contest with Armstrong for priority of inventorship and should prevail in this cause.

The main issue in this cause, therefore, is whether appellant discloses and claims the same invention as that claimed in Armstrong patent 1,962,702. That the two inventions are in fact the same is so clearly obvious from the record that there is cause for astonishment in appellee's refusal to concede the point.

Appellant and Armstrong Disclose and Claim Same Invention.

Both Armstrong and appellant claim an alloy steel *per se* as a new kind of material, without limitations on the use to which the steel is to be put.

Both Armstrong and appellant claim an alloy steel having the same six ingredients, and no others, to wit: iron, carbon, chromium, manganese, copper, and nickel.

The *percentage range* claimed by appellant (claim 9, p. 2) falls within the percentage range claimed by Armstrong (claim 1, pp. 39 and 40), as shown clearly by the tables appearing on page 16 of appellant's main brief and on page 2 of appellant's reply brief. That there is even this much difference between the composition limits is due, appellant believes, to less care on Armstrong's part to set accurate limits.

Appellee has made some point of the ratio of manganese to copper specifically claimed by Armstrong, to wit: the manganese being at least equal to the copper but not exceeding four times the copper and being in no case over 12%. It should be noted that Armstrong's claims cover alloys for uses even where intergranular corrosion is no problem, and in such cases there is no need to set the upper limit of manganese at four times the copper (p. 37, l. 85 to l. 97). *Appellant discloses and claims the important relationship, i.e., that manganese shall exceed the copper but shall not exceed 12%.*

To warrant its allowance of the Armstrong patent, the Patent Office must postulate that all compositions within Armstrong's range have the new and unobvious properties disclosed by Armstrong. Necessarily, therefore, appellant's alloys, being entirely within Armstrong's claims, must have those same new and unobvious properties.

In all essential respects, appellant and Armstrong describe the same properties of the alloy, although they use somewhat different language in their respective descriptions. Appellant discloses that the material may be deep-drawn (i.e. severely cold-worked), and that it is stain-resistant when so cold worked (definitions in Main Br., p. 4). Armstrong discloses that the alloy has a stable surface (i.e. is stain-resistant), and that it is resistant to phase change when quenched from high temperature and submitted to severe cold work (i.e. is stain-resistant after deep-drawing). Armstrong also mentions its forgeability and machineability, properties which necessarily accompany the other properties just mentioned.

Thus, Armstrong and appellant describe their respective inventions in terms which show agreement in so many particulars that it is certain beyond doubt that they are describing the same material.

There is one property which Armstrong mentions but appellant does not, to wit: resistance to intergranular corrosion, a type of corrosion which takes place only under very unusual circumstances. It is on this ground alone that appellee bases his refusal to grant a patent to appellant (p. 14, Conclusions of Law, especially No. 4). Only brief consideration of this ground is required to reduce the appellee's position to an absurdity.

Armstrong is not claiming a property of his alloy, nor does he claim the use of his alloy solely where such property is significant,—he claims a new kind of material for all uses, including thousands of ordinary uses where resistance to intergranular corrosion is of not the slightest moment. All that is necessary to establish the identity of the material itself, as claimed by Armstrong and appellant, is to describe accurately the composition and general properties determined by the usual tests; strength, ductility, toughness, and chemical resistance. Obscure properties do not make the identification more certain. To identify an elephant, for instance, it is not necessary to mention the animal's fondness for peanuts,—a characteristic exhibited only when the animal is exposed to peanuts in the unnatural environment of a circus,—it is sufficient to mention the more universally recognizable characteristics. Similarly, to identify the alloy here under consideration it is not necessary to mention resistance to intergranular corrosion,—a characteristic exhibited only under unusual conditions: a description of the more universally recognizable characteristics is quite sufficient.

The identity of the materials having been established, the identity of the new properties and results are necessarily established, because one material can not have two distinct sets of properties. And the claims in issue relate to a *material.*

The materials and properties being identical, there must be identity of invention. Appellant's alloy must be patentable over the art for the very reasons which impart patentability to Armstrong's alloy. And, since appellant filed before Armstrong, appellant is presumptively the first inventor, and therefore entitled to a patent.

It should be noted that a decree favorable to appellant in this cause would lead to a determination, within the Patent Office and by the customary interference procedure, of who is the first inventor, Becket or Armstrong. As the matter stands now, appellant, who filed *before* Armstrong, can not use or sell his steel without becoming liable to an infringement suit by Armstrong.

Precedent for Appellant's Position.

Situations quite similar to the present one have been dealt with by the United States Court of Customs and Patent Appeals. In the case of *Wemple and Daesen* v. *Peirce and Anderson* cited in appellant's main brief (22 U. S. C. C. P. A. 1064; 75 F. (2d) 998), for instance, two applicants disclosed alloy composition ranges which considerably overlapped. An interference was declared, the issue or count being the overlap in which the composition ranges of the respective applicants coincided. One of the applicants contended that there was not an identity of invention, because "the respective applications define different results, in that Wemple and Daesen sought and taught ductility as a desideratum, while Peirce and Anderson emphasized resistance to cold flow". The Court dismissed this contention with the statement: "We agree with the Board of Appeals that the results obtained or sought are not controlling. The counts are clear and unambiguous. The party securing the patent is clearly entitled to protection in the use of all substantial parts of the ranges covered. Appellees disclosed the ranges, and upon the record presented are entitled to the award of priority". The Court also pointed to their earlier decision in *Davis et al.* v. *Isham et al.* (21 U. S. C. C. P. A. 1222, 71 F. (2d) 204), which applied the same sensible rule to process claims.

In the present case, the Patent Office has granted to Armstrong a monopoly in an alloy composition for all uses, including those uses in which resistance to intergranular corrosion is of no significance. For appellee to say that appellant is not entitled to a patent on the same alloy composition, fully disclosed and described in his application in terms of percentage composition and outstanding useful properties, because appellant failed to emphasize a single obscure property, is to disregard both precedent and common sense.

Summary.

Appellant has disclosed clearly and fully a new kind of alloy steel having commercial importance. He has claimed this alloy steel precisely, setting forth the exact composition limits and the outstanding physical properties. That the claimed alloy steel is patentable, is apparent not only from the fact that no prior art reference discloses the same kind of material but also from the fact that the Patent Office granted a patent on this same alloy steel to a later applicant, P. A. E. Armstrong, who was not as specific as applicant in defining the new material.

Appellee's ground for refusing a patent to appellant, though granting one to Armstrong, is that Armstrong emphasizes a single obscure property not disclosed by appellant. Such ground is unsubstantial and wholly insufficient. By denying a patent to appellant, and granting one to Armstrong, appellee has committed the following errors which should not be allowed to persist:

a. Appellant has been denied the protection which is properly his under the Patent Statutes;

b. Appellant has been denied his "day in court" to contest priority of invention with Armstrong; and

c. A fallacious innovation in patent law has been established. If allowed to persist, this precedent will not only injure appellant in future cases, it will also give rise to confusion and injustice to other applicants in the Patent Office.

It is accordingly respectfully submitted that the decision of the District Court herein should be reversed.

Richard L. Scheffler,
Attorney for Appellant.

Ralph E. Parker,
Eugene L. Greenewald,
Donald C. Harrison.
Of Counsel.